

Dr. Bharat Bhushan
Academy Professor, The Ohio State University (San Jose, CA)

[Mech. Eng.](#); [ISI Highly Cited Researcher in Materials Science](#) and [Cross-field Category](#); and Top Ten Science Stories of 2015)
 (Authored 10 scientific books, 100+ handbook chapters, and 900+ scientific papers. Also edited more than 60 books and holds more than 25 U.S. and Foreign Patents.) *ResearcherID: A-9684-2013 ORCID: 0000-0001-7161-6601*
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RESEARCH INTERESTS

Fundamental studies in the interdisciplinary areas of Bio/nanotribology, Bio-/nanomechanics, Materials and Coatings, Nanomaterials Characterization, Scanning Probe Techniques, Magnetic Storage, Bio/nanotechnology, Nanomanufacturing, Bioinspired Liquid Repellency, Self-cleaning and Water Harvesting, and Science and Technology Policy.

ACADEMIC BACKGROUND

- | | |
|-------------|---|
| 2019 | University of Tyumen, Russia
Honorary Doctorate |
| 2011 | University of Kragujevac, Serbia
Doctoris Honoris Causa |
| 2000 | Metal-Polymer Research Institute of National Acad. of Sci., Gomel, Belarus
Honorary Doctor of Science |
| 1996 | Warsaw University of Technology, Warsaw, Poland
Doctor of Technical Sciences |
| 1990 | University of Trondheim, Trondheim, Norway
Doctor Technicae |
| 1980 | Rensselaer Polytechnic Institute, Troy, New York
M.B.A., Management (4.0/4.0) |
| 1976 | University of Colorado, Boulder
Ph.D., Mechanical Engineering (4.0/4.0) |
| 1973 | M.S., Mechanics (4.0/4.0) |
| 1971 | Massachusetts Institute of Technology, Cambridge
M.S., Mechanical Engineering (4.8/5.0) |
| 1970 | Birla Institute of Technology and Science, Pilani
B.E. (Hons.), Mechanical Engineering (84% marks) |

PROFESSIONAL EXPERIENCE

- | | |
|----------------|---|
| 1991- | The Ohio State University, Columbus, Ohio |
| Present | Department of Mechanical and Aerospace Engineering.
Academy Professor (San Jose, CA, 2020-),
Ohio Eminent Scholar and The Howard D. Winbigler Professor, and
Director, Nanoprobe Laboratory for Bio- & Nanotechnology and Biomimetics (formerly
Nanotribology Laboratory for Information Storage and MEMS/NEMS) ('91- '20)
Department of Materials Science and Engineering
Graduate Research Faculty Advisor ('91- '20)
Battelle Center for Science & Technology Policy, John Glenn College of Public Affairs
Affiliated Faculty Member ('91- '20)
(Established a major research laboratory, heavily funded by an international consortium of industries.
Organized and managed various interdisciplinary research programs.) |
| 1986-91 | IBM Corporation, Research Division, Almaden Research Center, San Jose, California
Head-Disk Interface, Storage Systems and Technology
Senior Engineer/Research Staff Member/Manager |

(Managed research programs at Almaden. Led an effort to setup a hard disk drive test lab at IBM, Fujisawa, Japan, which required numerous trips and extended stays in Japan. Oversaw development of product screening test plans. Also coordinated disk drive development between various IBM labs in the U.S. and Japan, that was a challenging given cultural difference.)

1981-86 IBM Corporation, General Products Division, Tucson, Arizona

81-85 Advanced Tribology, Development Laboratory
Advisory Engineer

85-86 Media Mechanical Process/Analysis, Development Laboratory
Development Engineer/Manager

1980-81 SKF Industries Inc., King of Prussia, Pennsylvania

Advanced Engineering and Analysis, Technology Services Division
Research Scientist

1976-80 Mechanical Technology Inc., Latham, New York

Advanced Technology, R & D Division

76-77 Physical Tribologist

77-78 Senior Engineering Scientist

78-80 Program Manager

1975- Expert Investigator – Accident Reconstruction, Product Liability, IP Infringement and Validity, and License Dispute. Gave expert report, deposition, and/or trial testimony in County Courts, U.S. District Courts, Superior Courts, State Courts, Federal Courts, International Trade Commission (ITC), Patent Trial and Appeals Board (PTAB), Arbitration Court, and Tokyo District Court.

REGISTRATION:

Professional Engineer (Mechanical), State of Pennsylvania, Registration No. 30421E.

HONORS AND AWARDS

1980 ASME - Henry Hess Award for the best original paper

1981 ASCE/AIME/ASME/IEEE/WSE - Alfred Noble Prize for the outstanding technical papers.

1983 ASME - Burt L. Newkirk Award for a notable contribution to the field of tribology in research or development.

1983 University of Colorado - George Norlin Award given to alumni who have attained eminence in their fields of endeavor.

1983 IBM Corporation - GPD Achievement Award for outstanding individual performance.

1985 University of Colorado Regents - Distinguished Service Award for outstanding achievement and meritorious contributions to American industry.

1985 IBM Corporation - Special Recognition Award for contribution to the IBM 3480 Tape Drive Program.

1985 IBM Corporation - Invention Achievement Award in appreciation and recognition of creative contributions to IBM progress.

1986 ASME - Gustus L. Larson Memorial Award to honor engineering graduates who have demonstrated outstanding achievements in mechanical engineering.

1987 NASA - Certificate of Appreciation to recognize the critical tasks performed in support of President Reagan's Commission investigating the Space Shuttle Challenger Accident. Valuable contributions assisted in identifying the actions required to return the National Space Transportation System to flight status.

1987 IBM Corporation - Research Division Award in recognition of outstanding contributions to an advanced, compact magnetic disk drive.

1989 ASME - Tribology Division Award for the best technical paper.

1990 IBM Corporation - Outstanding Technical Achievement Award for contributions to IBM 120 megabyte 3.5-inch hard disk drive.

1991 - Ohio Regents' Eminent Scholar and The Howard D. Winbigler Professor.

1992 ASME - Melville Medal, the highest ASME honor for the best current original paper.

1997 ASME – Board of Governors Award for valued services in advancing the engineering profession as Founding Chair of ISPS Division.

- 1997, '01, '07 **Ohio State University - Lumley Research Award** in recognition for outstanding research accomplishments.
- 1998 **ASME – Board of Governors Award** for valued services in advancing the engineering profession as Chair of ISPS Division.
- 1998 **ASME - The David Blaine Award** for achieving the highest percentage of membership growth in a technical division.
- 2000 **Pi Tau Sigma and ASME - Charles Russ Richards Memorial Award** to recognize outstanding achievement in mechanical engineering.
- 2004 **ASME - Board of Governors Award** for valued services in advancing the engineering profession as secretary and co-chair (2004) and as a member (2003) of National Nominating Committee.
- 2004 **ASME - The Robert Henry Thurston Lecture Award** for prolific, groundbreaking authorship and pioneering research in the general fields of Nanotribology and nanomechanics and in the emerging field of Nanotechnology.
- 2005 **The OSU Research News of the Year - Nature Inspires Nanotech**, selected as the coolest science story at the OSU by the Science Coalition, an organization of U. S. universities. Presented by OSU President as a poster at the roundtable for university presidents and media.
- 2012 **Ohio State University – Lumley Interdisciplinary Research Award** in recognition of outstanding research accomplishments.
- 2014 **STLE - International Award for Outstanding Contribution to Tribology and/or its Related Sciences**. It is Society's highest honor for lifetime achievement in Tribology and bestows lifetime honorary membership.
- 2015 **BITS Distinguished Alumni Award (Pilani)** to recognize and honor those alumni who have brought laurels to their alma mater by making significant and outstanding contributions to their profession, their businesses, and/or to the society.
- 2015 **Institution of Chemical Engineers (UK) Global Award** for Water Management. This involves development of oil-water separation technology using durable green coatings. Also, High Commendation for Oil and Gas Global Award.
- 2015 **Top Ten Science Stories of 2015 (Insights.com)** - Nanocoated- mesh for Oil-Water Separation.
- 2016 **Ohio State University - Scott Faculty Award** for excellence in engineering education.
- 2017 **Ohio State University - Innovators Award** for translation of research into new products and/or technologies.
- 2018 **ASME - Distinguished Speaker Award** for valued services in advancing the engineering profession and pioneering contributions and leadership in tribology and mechanics of magnetic storage devices industry.
- 2018 **ASME - Dedicated Service Award** for dedicated voluntary service to the society marked by outstanding performance, demonstrated effective leadership, prolonged and committed service, devotion, enthusiasm, and faithfulness.
- 2019 **ASME - Certification of Appreciation** for valued service to Engineering Sciences Segment Board, 2016-19.
- 2019 **ASME - ISPS Distinguished Institution Award** for founding the Information Storage and Processing Systems Division and for pioneering research and contributions to the data storage industry.
- 2020 **ASME – Mayo D. Hersey Award** for more than four decades of outstanding contributions to the advancement of tribology as a prolific author and internationally recognized expert at the micro-to-nanoscales; and as a pioneer of the tribology of magnetic storage devices, whose influence has extended to the interdisciplinary areas of biological and materials science. It is Society's highest honor for lifetime achievement in Tribology.
- 2020 **ASME - Board of Governors Award** for valued services in advancing the engineering profession as the member of Nominating Committee (2019-2020).
- 2020 **International Tribology Council - Tribology Gold Medal** in recognition of his outstanding and supreme achievements in Tribology, with five decades of distinguished and continued contributions to its advancement as a prolific author and internationally recognized expert at the nano-to-microscales. His research contributions have significantly extended to the interdisciplinary areas of biological and material science, and he has pioneered the tribology of magnetic storage devices, bio-/nanotechnology, cosmetics and biomimetics, nanotribology and green tribology.

TOP SCIENCE STORIES OF THE YEAR

- 2015** **Nano-Coated Mesh Filters Oil from Water**
Top Ten Science Stories of 2015 – 52-Insights.com
<http://www.52-insights.com/inspirations/top-ten-science-stories-of-2015/>
Top Fifty Stories of the Year – Discover Magazine
<http://discovermagazine.com/2016/janfeb/42-layer-cake-of-nanoparticles-could-clean-up-oil-spills>
Top on REDDIT; hosted AMA (Ask Me Anything) session

PUBLIC SCIENCE LECTURES

- 2018** **Science Sundays Public Lecture, “Lessons from Nature: Bioinspired Surfaces for Green Science and Technology,”** Free Arts and Sciences Public Lecture Series, hosted by The Ohio State University, Columbus, Ohio, October 14, 2018.
 Attended by about 250 people.
- 2019** **TEDx Talk, “Lessons from Nature: Bioinspired Surfaces for Green Technology,”**
 2019 TEDx Event: Fuse, Columbus, Ohio, Feb. 23, 2019.
 Attended by about 1500 people, a ticketed event; broadcast live.
<https://www.youtube.com/watch?v=QAH0N328okE>

PROFESSIONAL AND HONORARY SOCIETY MEMBERSHIPS

- 1973-** Sigma Xi
1974- Tau Beta Pi
1985- American Society of Mechanical Engineers (ASME) (Fellow and Life Member)
1986- The New York Academy of Sciences (Fellow and Life Member)
1993- The Ohio Academy of Science (Member)
1998- Byelorussian Academy of Engineering and Technology, Belarus (Foreign Member)
1998- Academy of Triboengineering of Ukraine (Foreign Member)
1998- The Society of Tribologists of Belarus (Honorary Member)
1999- International Academy of Engineering, Russia (Foreign Member)
 The Institute of Electrical and Electronics Engineers (IEEE)
2001 Fellow
2017- Life Fellow
2001- American Society for Engineering Education (Member)
 Society of Tribologists and Lubrication Engineers (STLE)
2004 Fellow
2014- Honorary Member
2010- International Society of Bionic Engineering (ISBE) (Founding Member, Fellow and USA Rep.)
2012 Royal Society of Chemistry, UK (Member)

HONORARY/VISITING PROFESSORSHIP

- 1990-** Honorary Professor, Norwegian University of Science and Technology, Trondheim, Norway.
1996- Honorary Professor, Warsaw University of Technology, Warsaw, Poland.
2004-2018 Honorary Professor, China University of Mining and Technology, Xuzhou, China.
Dec. 2009-15 Honorary Professor, College of Engineering Sciences, King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia.
July 2011-14 Visiting Professor, Faculty of Engineering, University of Kragujevac, Kragujevac, Serbia.
Oct. 2011-14 Visiting Professor, National Center for Advanced Tribology, University of Southampton, Southampton, U.K.

Feb. 2012-15,	Chief International Academic Advisor to the President and Visiting Professor of Nanoscience and Nanotechnology, Harbin Institute of Technology, Harbin, China.
April 2017-20	
June 2013-14	Visiting Professor, State Key Laboratory of Tribology, Tsinghua University, Beijing, China.
Dec. 2016-17	Adjunct Professor, VIT University, Vellore, Tamil Nadu, India.
Jan-Feb. 2023	Satish Dhawan IoE (Institute of Excellence) Visiting Chair Professor, Division of Mechanical Sciences, Indian Institute of Science, Bengaluru, India.
Feb-March 2023	Distinguished Adjunct Professor, Birla Institute of Technology and Science (BITS) Pilani, Hyderabad Campus, India.
March 2023	Distinguished Adjunct Professor, Birla Institute of Technology and Science (BITS), Pilani, India.

FELLOWSHIPS/SABBATICAL LEAVES/INTERNATIONAL DELEGATIONS

Sept. 1970- Aug. 1971	Ford Foundation Graduate Fellowship, Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts.
May-July 1987	Visiting Senior Scientist, The Royal Norwegian Council for Scientific and Industrial, Research, Department of Machine Design and Materials Technology, University of Trondheim, Norway.
1989	Visiting Scholar, Department of Mechanical Engineering, Chemistry, and Materials Science and Mineral Engineering, University of California, Berkeley, California.
June 1989	Visiting Senior Scientist, The U.S.S.R. Academy of Sciences, Moscow, Gomel, Vilnius and Leningrad.
Oct.-Nov. 1995	United States NSF Delegation of Scientists and Engineers to visit Korea and Japan (Delegate).
July-August 1997	Sony Sabbatical Chair Professor, Sony Corporation Research Center, Yokohama, Japan.
Sept. 1998- Feb. 1999	Alexander von Humboldt Research Prize for Senior Scientists, Universitaet Karlsruhe; Institut fuer Werkstoffkunde und Institut fuer Materialforschung, Forschungszentrum Karlsruhe, Germany.
Feb. 1999	Guest Professor, Nanotribology and Microelectromechanical Systems, Cavendish Laboratory, Departments of Physics and Engineering, Univ. of Cambridge, U.K.
March-April 1999	Fulbright Senior Scholar Award and Guest Professor, Technische Universitaet Wien, Institut fuer Feinwerktechnik, Wien, Austria.
March 1999	Franco-American Commission for Educational Exchange, Paris, Interfoundation Grant, Ecole Centrale de Lyon, France.
May-Sept. 1999, Jan.- Feb. 2001	Alexander von Humboldt Research Prize for Senior Scientists, Universitaet Ulm, Abteilung Experimentelle Physik, Germany.
Dec. 1999- Jan. 2000	United Nations Senior TOKTEN Expert Award, Indian Institute of Technology, Delhi and Indian Institute of Science, Bangalore, India.
Jan.-Feb. 2002	Max Planck Foundation Research Award for Outstanding Foreign Scientists, Max-Planck Institut fuer Eisenforschung, Duesseldorf, Germany.
July 2003	Senior Academic Visitor, Institut de Physique de la Matiere Complexe, Ecole Polytechnique Federale de Lausanne (EPFL), Lausanne, Switzerland.
April 2005	Guest Professor in Nanotechnology, Eidgennoessische Technische Hochschule (ETH), Nanotechnology Group, Zurich, Switzerland.
Sept-Oct. 2006	Visiting Professor, Sciences et Techniques de l'Ingenieur (School of Engineering and Applied Science) and Institut de Physique de la Matiere Complexe, Ecole Polytechnique Federale de Lausanne (EPFL), Lausanne, Switzerland.
Nov. 2006	Invited Professor, Laboratoire de Physique des Solides, Universite Paris Sud XI Orsay, France.
Jan.-May 2007	Senior Visiting Scientist (Jan.-Feb.) & Alexander von Humboldt Research Prize for Senior Scientists (March-May), Max-Planck Institut fuer Metallforschung, Stuttgart, Germany.
June 2010	Guest Scientist/Professor, EU Seventh Framework Programme, Marie Curie Initial Training Networks, MINILUBES, Faculty of Mechanical Engineering, University of Ljubljana, Ljubljana, Slovenia.
June 2011	Guest Scientist/Professor, EU Seventh Framework Programme, Marie Curie Initial Training Networks, MINILUBES, School of Engineering, Cardiff University, Cardiff, U.K.

Sept. 13-Aug. 14	ASME/AAAS Science & Technology Policy Fellow, House Committee on Science, Space, and Technology; detailed to House Committee on Energy and Commerce and House Committee on Oversight and Government Reform, United States Congress, Washington, D.C.
Dec. 2016	Global Initiative of Academic Networks (GIAN) in Higher Education by Government of India, Indian Institute of Technology, Ropar, India.
June-July 2022	Visiting Professor, Sciences et Techniques de l'Ingenieur (STI) (School of Engineering) and Institut de Bioingenierie (IBI), Ecole Polytechnique Federale de Lausanne (EPFL), Lausanne, Switzerland.
Jan.-Feb. 2023	Satish Dhawan IoE (Institute of Excellence) Visiting Chair Professor, Division of Mechanical Sciences, Indian Institute of Science, Bengaluru, India.

INSTITUTE/WORKSHOP/CONFERENCE ORGANIZATIONS

1996	NATO Scientific and Environmental Affairs Division, Brussels, Belgium, NATO -Advanced Study Institute Course on "Micro/Nanotribology and its Applications," Sesimbra, Portugal, June 16-28, 1996 (ASI Director). Also travel support from National Science Foundation (Surface Engineering and Tribology Program and Directorate for Education and Human Resources), Office of Naval Research (Materials Division), The Scientific and Technical Research Council of Turkey (TUBITAK) and Instituto de Cooperaco Cientifica, e Tecnolgica Internacional, Portugal.
1997	National Science Foundation, Arlington, Virginia, and Air Force Office of Scientific Research, Bolling AFB, Washington, D.C., Workshop on Tribology Issues and Opportunities in MEMS, Columbus, Ohio, Nov. 9-11, 1997.
2000	NATO Scientific and Environmental Affairs Division, Brussels, Belgium, NATO -Advanced Study Institute Course on "Fundamentals of and Bridging the Gap Between Macro- and Micro/Nanoscale Tribology," Keszthely, Hungary, Aug. 13-25, 2000 (ASI Director). Also, travel support from National Science Foundation (Surface Engineering and Tribology Program and Directorate for Education and Human Resources), The Scientific and Technical Research Council of Turkey (TUBITAK) and Instituto de Cooperaco Cientifica, e Tecnolgica Internacional, Portugal.
2019	First ECI Nature-Inspired Engineering Conference, Engineering Conferences International (ECI), Cetraro (Calabria), Italy, Sept. 8-13, 2019.
2023	International Summit on Biotechnology and Bioinformatics (ISBB 2023), San Francisco, CA, Sept. 14-16, 2023.

INCLUSION OF WORK IN BOOKS

2004-	Raspberries of Fullerene Lubricant – Foundations of College Chemistry, eleventh to thirteenth edition, M. Hein and S. Arena, and General Organic Chemistry, tenth edition, M. Hein and S. Arena, Wiley, New York.
2009-	Images of Lotus Leaf – Didactics Textbooks of Chemistry, Iconografia – Editora Moderna, Sao Paulo, Brazil.

NATIONAL/INTERNATIONAL MEDIA COVERAGE

April – August 1986	"Minor Miracle" - Restorations of the Severely Damaged Voice and Data Tapes from Challenger Space Shuttle Accident - covered by The Orlando Sentinel (4/29/86), New York Times (6/19/86, 7/18/86), New York Herald Tribune (6/20/86), Washington Post (7/18/86, 7/29/86), Arizona Daily Star (7/18/86), Arizona Republic (7/18/86), NASA News (7/28/86), Houston Chronicle (7/29/86), Houston Post (7/29/86).
Feb.-March 1993	"Buckyballs" May Make Great Solid Lubricants - covered by CNN Headline News (3/18-3/19/93), International Radio News Service (2/93), National Newspapers (2/93), Columbus Dispatch - Top 10 Local Science Stories of the Year (12/26/93), Science News (2/20/93), MIT Technology Review (4/93), Condensed Matter News (Jan/Feb 1994), Cover page of Condensed Matter News (March/April 1994) and other Science Magazines.

April-August 1995	Friction on an Atomic Level Might Lead to Better Computer Disk Drives - All Things Considered covered by National Public Radio (4/12/95), Business Week (5/1/95), Chicago Tribune (5/14/95), Philadelphia Inquirer (5/22/95), Charlotte Observer (6/8/95), The Dallas Morning News (8/14/95), Discover (10/95), and several Science Magazines.
Feb. 1998	Scientists Rein in Friction - covered by Christian Science Monitor (2/5/98).
Sept. 1998	Better Ways to Grease Industry's Wheels - covered by Fortune (9/28/98).
July 2000	Scientists Develop New Methodology for Fracture Toughness Assessment - covered by JOM (A publication of The Minerals, Metals & Materials Society) (7/2000).
July 2000	The Little Engines That Couldn't - Tired of Grinding Their Gears, Micromachine Researchers Turn to Surface Science - covered by Science News (7/22/2000).
March-Nov. 2001	Researchers Pioneer Techniques to Lubricate Microdevices - covered by News in Engineering at Ohio State University (cover page) (Spring 2001), On Campus (3/29/01), United Press International (3/28/01), Product Information HQ (3/28/01), Nanotech Alert (3/30/01), Science Daily Magazine (4/2/01), R&D Magazine Newsletter (4/3/01), Beyond 2000 (4/4/01), Global Technoscan (4/4/01), MEMS Center (4/4/01), Advanced Coatings and Surface Technology (4/6/01), Electronic Eng. Times (4/9/01), Medical Device and Diagnostic Industry Magazine (4/9/01), New Scientist (4/14/01), Electronics Weekly (4/18/01) Yahoo-Nanotechnology Page (4/24/01), Materials Performance Magazine (6/01), The Futurist (7-8/01), and theworkcircuit.com (11/20/01).
Dec. 2002	Living With Cracks Leads to a Long Life - Characterization - covered by Materials Today, Dec. 2002.
April-June 2003	Storage Methods Come and Go, but Tape Holds Its Own - covered by New York Times (6/5/03), International Herald Tribune (6/6/03), Micro Nano (R&D Magazine) (6/03), Science Daily (4/18/03), Newsfactor (4/18/03), CRM Daily (4/18/03), Science Blog (4/21/03), and many more.
Jan. 2005-Dec. 2008	On the Road to Low-Friction Micro Devices, Some Bumps - covered by New York Times (1/27/05), CNETNews.com (1/19/05), ABCNews.com (1/26/05), TV Channel 10 CBS News (1/26 - 1/27/05), Science News (1/28/05), Toledo Blade (1/31/05), High-Technology Materials Alert (1/28/05); South China Morning Post (2/1/05), Globe and Mail.com (2/16/05), Columbus Dispatch (3/15/05), Materials Performance (3/05), News in Engineering (Spring 2005, Fall 2006); Feature in ME News (Fall 2005); and numerous web sites. Selected as The Research Story of the Year 2005 of the Ohio State University - Science Coalition (an Organization of Universities) meeting attended by University Presidents; Readers Digest , Canada (4/06, p. 85); Washington Post (12/29/08).
Sept. 05-March 2008	Nanotechnology Confronts the "Bad Hair Day, Tests New Conditioner - covered by Nanotechnology Now (9/7/05), Hindustan Times (9/10/05), Discovery News for the Discovery Channel (9/20/05); India West (9/30/05); Times of India (9/30/05); Tech Comm (10-11/05), TV Channel 10, Columbus CBS News (11/27/05); Materials Today (11/05); News in Engineering (Autumn 2005); Tech News (Fall 2005); Futurist (1-2/06); BBC Focus, TV Discoveries and Breakthroughs Inside Science (1/06); Allure (3/06, p. 178); TV Channel 7, San Francisco, ABC News (5/5/06); Nanowerk Spotlight (5/23/06); New York Daily News (6/14/06); Bourne Report Radio Show (3/23/08) and numerous websites.
Oct. 2007	Ohio Researchers Look to Animal Kingdom (Gecko) for Inspiration - covered by The Plain Dealer , Cleveland (10/28/07).
Aug. 2009	Intelligent Design Implications disclaimed as Biomimicry are Increasingly Discussed in Scientific Literature - covered by Discovery Institute (8/24/09).
Dec. 2009	Skin Cream Secrets Revealed, covered by Live Science (12/7/09), FoxNews.com (12/7/09), EMkid.net (Yahoo! News) (12/7/09), NewsLycos.com, and many more.
May 2010	Nature is the Model Factory, Newsweek (5/28/10); Naturally Inspired, Scientists Mimic Flora, Fauna to Create New Technologies, covered by Columbus Dispatch (5/23/10), covered by Nano Magazine (8/20/10).
Sept. 2010	Engineers, Surgeons Team up for Disease Detection, Ohio State University (9/13/10).
Oct. 2010	How Batteries Grow Old, Science News (10/19/10); e! Science News (10/19/10); IEEE Spectrum (10/19/10).
April 2011	Lab-Grown Synthetic Skins Could Replace Animals in Cosmetic Testing, Ecouterre (4/20/11); Daily Tech (4/19/11); ktn.innovateuk.org (4/19/11); Cosmeticsdesign.com (4/21/11); IChemE tcetoday.com (4/20/11).

May 2012	Biomimicry, Ohio State Alumni Magazine (May-June).
Dec. 2012	Study Reveals New Factor That Could Limit the Life of Hybrid and Electric Car Batteries, OSU University Communications (12/11/12).
Nov. 12- 14	How Butterfly Wings Can Inspire New High-Tech Surfaces, NSF Science Now (11/16/12); Covered by NSF Discoveries News , Columbus Dispatch (12/2/12); sciencenewslne.com (11/7/12); gizman.com (11/8/12); qmed.com (11/12); eetimes.com (11/8/12); redorbit.com (11/8/12); scilifestyle.com (11/12/12); microscopy-analysis.com (11/12/12); eetasia.com (11/12/12); sciencebusiness.technewslit.com (11/12/12); silobreaker.com (12/2/12); MRS Materials 360 online (12/18/12); NSF Livescience and Discovery Page (1/23/13); Inside Science TV & American Institute of Physics (11/13); Awake (4/14), www.jw.org ; The journal with the second highest worldwide monthly circulation (45 million in 99 languages), etc.
Oct. 19, 2014	"Biomimetics: Bioinspired Superomniphobic, Self-cleaning/Antifouling and Low Drag Surfaces," Lunch with a Scientist, ScienceWriters 2014 , The Annual Joint Meeting of the National Association of Science Writers (NASW) and the Council for the Advancement of Science Writing (CASW), Columbus, Ohio, 10/17-21, 2014.
Jan. 16, 2015	News about 2013-14 Science and Technology Policy Fellowship at the U.S. Congress, Washington, D.C., ASME News (1/16/15). https://www.asme.org/about-asme/news/asme-news/former-congressional-fellow-bhushan-encourages
April 15, 2015-16	"Scientists Develop Mesh that Captures Oil - but Lets Water Through," Covered by OSU News (4/15/15), Phys.Org (4/15/15), Science Daily (4/15/15), Mumbai Mirror (4/16/15), Business Standard India , (4/16/15), IFL Science (4/17/15), Times of London (4/18/15), Inside Science (4/20/15), Christian Science Monitor (4/21/15), NSF (4/23/15), Oil and Gas Daily (4/22/15), Wall Street Daily (5/6/15), Columbus Dispatch (5/10/15), etc. and Video - Discovery Channel News (4/21/15), and Radio - NPR Radio (4/21/15) and Texas Standard, a Statewide News Show on NPR (4/23/15), NSF Audio (6/5/15); Sierra Club Magazine (9-10/15); Inside Science TV & American Institute of Physics Video (11/18/15); MIT Technology Review (5-6/16).
Nov. 5, 2015	Institution of Chemical Engineers (UK) Global Award for technology development of oil-water separation using durable green coatings.
June 27, 2016 -Dec. 2016	"A shampoo bottle that empties completely – every last drop," Covered by NY Times , Washington Post , USA Today , San Diego Union Tribune , International Business Times , Newsweek , Daily Mail (UK) (200 million readers), Independent (UK) , Telegraph (UK) , Sydney Morning Herald , Corriere della Sera (Italy) (most famous daily paper), STAT , New Scientist , Allure , InStyle , Cosmo , CNN , CNBC , CBS , NBC , BBC , ABC Australia , NBC News , Inside Science TV & American Institute of Physics Video (12/16), Dutch Radio (6/16), etc.
May 9, 2017	"Learning rocket science from spiders & dragonflies," Covered by Times of India .
April 19, 2018	"A better fake leather, inspired by plants," Covered by many news outlets including Times of India and Materials Today .
May 8, 2018	"Bioinspired Liquid Repellant and Self-Cleaning Surfaces", BYU Sirius XM Radio 143 , "Top of Mind with Julie Rose" program Interview aired on 5-8-18
June 25, 2018	"Ohio State Looking to Mosquitoes for a Way to Develop Painless Microneedles," NBC , CBS , Life and More Magazine , Times of India , etc..
Aug. 13, 2018	"Nanotechnology and Bioinspired Liquid Repellant and Self-Cleaning Surfaces," Brazilian Research Network in Nanotechnology, Society, Environment and News Technologies Renanosoma, www.nanotecnologiadoavesso.org , Nanoweb TV, Program - Nano Alerta and Nanotecnologia Do Avesso , 55 minute Interview aired live on 8-13-18.
Oct. 8, 2018	"How Wasp and Bee Stinger Designs Help Deliver the Pain," Miami Herald , Star Telegram , The Herald Sun , Sun Herald , The Charlotte Observer , Phys.org. , Science and Life Russia , etc.
Dec. 26, 2018	"Collecting Clean Water from Air, Inspired by Desert Life," Engineering 360 , 3D Printing , KCBS Radio , San Francisco , aired on 1/8/19.
Fall 2020	"Nature Offers the Finest Models," Beauty is All Around , Ohio State Alumni Magazine .
Jan. 3, 2023	"Learn from Animals: QED with Dr. B – Nature Teaches us to Make Better Devices," National Public Radio – WOSU TV , aired on 1/3/23.

NEWS - YOUTUBE VIDEOS and RADIO LINKS

Buckyballs in CNN Headline News Story, 3/18/93

<https://www.youtube.com/watch?v=crcO3AfHqRE>

Lotus Leaf Bumpy Glass in CBS News Columbus, Ohio, 1/26/05

<https://www.youtube.com/watch?v=MMA0o8DhKIw>

Hair news: TV Discoveries and Breakthroughs Inside Science, 1/06

https://www.youtube.com/watch?v=0Sqz7ZG_1hQ

Hair-CBS-Columbus Ohio, 11/27/05

<https://www.youtube.com/watch?v=vcw3XeN898o>

Inside Science TV and The American Institute of Physics, 11/2013

Butterfly Wings May Improve Airplane Wings

https://www.youtube.com/watch?v=GZ3cS9_hnU8

Evolution – Butterfly Wings

<https://www.youtube.com/watch?v=iClcwQVTSRs>

6/2015 Oil-water Separation

OSU News

Scientists develop mesh that captures oil—but lets water through, 6/15

<https://news.osu.edu/news/2015/04/15/oilnano>

Discovery Channel News, 4/21/15

How Do We Clean Up Oil Spills?

<https://youtu.be/3DbSIag3F3A>

Inside Science TV and The American Institute of Physics, 3/16

Nature-Inspired Material Cleans Up Oil Spills

<https://youtu.be/OxDtqdgmkSw>

I Chem E Global Award Ceremony, Birmingham, UK, 11/5/15

Winner of the Water Management and Supply Award – I Chem E Global Awards 2015

<https://youtu.be/3gqkirE-RG8>

Radio - Texas Standard, a Statewide News Show on NPR, 4/23/15

My segment on oil-spill starts at the 17:40

<http://www.texasstandard.org/shows/04232015/texas-standard-for-april-23-2015/>

NSF Radio, 6/5/15

Oil-water separation

http://nsf.gov/news/mmg/mmg_disp.jsp?med_id=78647

7/2016 Self-cleaning Shampoo Bottle

Dutch Radio Broadcast This Week, BNR Nieuwsradio, Amsterdam, 7/1/2016

Self-cleaning shampoo bottles

<http://www.bnr.nl/radio/wetenschap-vandaag/10307146/over-een-paar-jaar-kunnen-shampooflessen-doorzichtig-zijn>

Inside Science TV and The American Institute of Physics, 12/16

Science Helps Squeeze out Every Last Drop

Scientists have invented a coating for the inside of bottles, so you can finally get out every last drop of whatever is inside

<https://www.youtube.com/watch?v=PDHEgLfB-0U>

8/2016 Shark Skin and Black Skimmer Bird for Low Drag

OSU Video - Bhushan uses computational modeling to explore drag-reducing inspired by black skimmer birds, shark skin, 10/16

https://www.osc.edu/press/inspired_by_nature

Inside Science TV and The American Institute of Physics, 6/29/17

Grooves on a Bird's Beak Help It Fly Faster

Scientists are inspired by a unique bird to help make fluids flow faster.

<https://youtu.be/hzus4EN5svY>

5/2018 Self-cleaning and Liquid Repellency

BYU Sirius XM Radio 143, Top of Mind Program Interview, 5/8/18

Bioinspired Liquid Repellent and Self-Cleaning Surfaces

<http://www.byuradio.org/episode/329598dc-36f0-444d-a797-de854873dbe6?playhead=1112&autoplay=true>

Nanotechnology and Bioinspired Liquid Repellent and Self-cleaning Surfaces

<https://www.youtube.com/watch?v=JxGCIdBpelk>

6/2018 Mosquito Painless Piercing

OSU News - Ohio State Looking to Mosquitoes for a Way to Develop Painless Microneedles, 6/25/18

<https://www.youtube.com/watch?v=2oT8v5ktBjo&feature=youtu.be>

10/14/2018 Science Sundays Public Lecture

OSU - Lessons from Nature: Bio-inspired Surfaces for Green Science and Technology, Free Arts and Sciences Public Lecture Series hosted by The Ohio State University, Columbus, Ohio, 10/14/18

<https://www.youtube.com/watch?v=GAdrwVupAg4>

1/8/2019 Collecting Clean Water from Air, Inspired by Desert Life

KCBS Radio, San Francisco, Midday News Interview, 1/8/19

Make Clean Water Out of Air

<https://kcbsradio.radio.com/media/audio-channel/make-clean-water-out-air>

2/23/2019 TEDx Talk, “Lessons from Nature: Bioinspired Surfaces for Green Technology,”

2019 TEDx Event: Fuse, Columbus, Ohio, Feb. 23, 2019.

Attended by about 1400 people, a ticketed event; broadcast live.

<https://www.youtube.com/watch?v=QAH0N328okE>

1/3/2023 Learning from Animals: QED with Dr. B - Nature Teaches us to Make Better Devices

NPR – WOSU TV, Jan. 3, 2023

https://www.youtube.com/watch?v=nzUieU3Sp3Q&ab_channel=WOSUPublicMedia

TEACHING EXPERIENCE

1989	University of California, Berkeley. Departments of Mechanical Engineering and Materials Science and Mineral Engineering Guest lecturer	
1999	University of Cambridge, Cambridge, U.K. Cavandish Laboratory, Departments of Physics and Engineering Guest Professor Winter 1999 M. Phil Course in Microelectronic Engineering and Semiconductor Physics	
1999	Technische Universitaet Wien, Wien, Austria The School of Electrical Engineering Guest Professor Summer 1999 VO 358.031 Microtribology in MEMS Summer 1999 VO 358.014 Introduction to MEMS (in parts) Summer 1999 VO 358.032 Micromachining (in parts)	
2005	Eidgenoessische Technische Hochschule (ETH), Zurich, Switzerland Department of Mechanical and Process Engineering Summer 2005 151-0612-00L Measurement Techniques in Nanotechnology (in parts)	
1991-	The Ohio State University, Columbus. Ohio Eminent Scholar and The Howard D. Winbigler Professor (1991-) ME 560 Design Methodology and Materials Selection ME 837 Materials, Coatings, and Surface Treatments for Tribology ME 765 Principles of Tribology	1991-1993 1991-1992, 1994-1995 1992-2012

ME 581 Mechanical Engineering Laboratory	1993-1994, 2008-2011
ME 563 Design of Selected Machine Elements II	1995-1997, 1999-2000, 2011-2012
ME 837 Advanced Topics in Tribology	1997-1998
CHEM 694 Chemistry for Nanotechnology (with Prof. James V. Coe, Chemistry)	2004-2005
ME 837 Bio- & Nanotechnology and Biomimetics	2006, 2008, 2010
ME 7765 Principles of Tribology	2013-2019
ME 7837 Nanotechnology and Biomimetics	2013, 2017
PUBAFR/ENVENG 5600 Science, Engineering, and Public Policy	2015-2020

Generally obtained overall rating of excellent by students in his classes. He has been ranked as one of the best four instructors in Senior Exit Interview several times. Examples based on senior student exit surveys follow.

- Genuinely interested in subject matter.
- Had Prof. Bhushan for ME 581. Was very helpful at all times with any part of the project. Good personality and very intelligent.
- I had Prof. Bhushan for my ME 581 lab professor, and he was very good at helping with our project and was very interested in our understanding of the material.
- PUBAFR 5600 -- Appreciate your insights and experience. Your perspective was a nice complement to the overall arc of the course.

SHORT COURSES TAUGHT

1. "Lubrication Engineering and Technology" (2-day course), **UCLA Extension**, Los Angeles, 1984.
2. "Tribology of Magnetic Head-Tape Interface," Videotaped a four-hour course, **IBM Corporation**, Tucson, Arizona.
3. "Tribology and Mechanics of Magnetic Storage Devices" (2-day course), **3M Center**, St. Paul, Minnesota, November 11-12, 1991; March 23-24, 1992; August 10-11, 1992; March 22-23, 1993.
4. "Tribology of the Head-Medium Interface" (1-day course), Institute for Information Storage Technology, **Santa Clara University**, Santa Clara, California, December 9, 1991.
5. "Microtribology of Magnetic Storage Devices" (1-day course), Executive Seminar, **Intermag 92, IEEE International Magnetism Conference**, St. Louis, Missouri, April 12, 1992.
6. "Tribology of Magnetic Storage Systems" (1-day course), **Conner Peripherals Disk Division**, Milpitas, California, May 6, 1992.
7. "Historical Evolution of Magnetic Storage Devices" and "Recording Head-Medium Interface" (12-day course), **NATO-Advanced Study Institute Course on "High Density Digital Recording,"** Il Ciocco, Italy, June 7-19, 1992.
8. "Tribology of Magnetic Storage Systems" (1-day course), **Century Hyatt Hotel**, Tokyo, Japan, August 31, 1992.
9. "History of Tribology and Nanotribology" and "Nanotribology and its Applications to Magnetic Storage Devices and MEMS" (12-day course), **NATO - Advanced Study Institute Course on "Forces in Scanning Probe Methods,"** Schluchsee, Germany, March 7-18, 1994.
10. "Tribology of the Head - Medium Interface" (1-day course), **Asia-Pacific Magnetic Recording Conference Tribology Workshop**, Shangri-La Hotel, Singapore, November 28, 1995.
11. "Micro/Nanotribology and its Applications" (12-day course), **NATO - Advanced Study Institute Course - ASI Director**, Sesimbra, Portugal, June 16-28, 1996.
12. "Tribology of the Head/Media Interface" (1-day course), **Institute for Information Storage Technology**, Santa Clara University, Santa Clara, California, Aug. 22, 1996.
13. "Tribology and Mechanics of Magnetic Storage Devices" (1-day course), **Storage Technology Corporation**, Louisville, Colorado, Sept. 11, 1996.
14. "Tribology of the Head-Medium Interface" (1/2-day course), **Quantum Corporation**, Shrewsbury, Massachusetts, March 18, 1998.
15. "Surface Roughness and Contact Modelling" (1-day course), **Quantum Corporation**, Shrewsbury, Massachusetts, July 6, 1998.
16. "Tribology of the Head-Medium Interface" (1-day course), **IEEE Asia-Pacific Magnetic Recording Conference Tribology Workshop**, Singapore International Convention & Exhibition Center, Singapore, July 28, 1998.
17. "Nanotribology and Microelectromechanical Systems" (1-week lecture), M. Phil. Course in Microelectronic Engineering and Semiconductor Physics, Cavendish Laboratory, Departments of Physics and Engineering, **University of Cambridge**, Cambridge, U.K., Feb. 8-12, 1999.

18. "Advances in Interface Tribology" (1/2-day course), **Tenth Annual ASME Symposium on Information Storage and Processing Systems**, San Jose, California, June 28, 1999.
19. "Applied Tribology of Micro/Nanocontacts" (2-day course), Industrial Tribology, Machine Dynamics and Maintenance Engineering Center (ITTMEC), **Indian Institute of Technology**, Delhi, India, Dec. 16-17, 1999.
20. "Nanoscale Tribology and Mechanics of MEMS/NEMS" (1/2-day course), **ASME International Mechanical Engineering Congress and Exposition**, New York, New York, Nov. 13, 2001.
21. "Nanoscale Tribology and Mechanics of MEMS/NEMS" (1/2-day course), **Integrated Nanosystems 2002**, ASME Nanotechnology Institute, Berkeley, California, Sept. 17, 2002.
22. "Nanoscale Tribology and Mechanics of MEMS/NEMS" (1/2-day course), Excellence Course for the Interpolytechnic Ph.D. School, **Politecnico di Torino**, Torino, Italy, July 7, 2003.
23. "Nanoscale Tribology and Mechanics of MEMS/NEMS" (1/2-day course), **16th International Vacuum Congress, 12th International Conference on Solid Surfaces, and 8th International Conference on Nanometer-Scale Science and Technology**, Venice, Italy, June 27, 2004.
24. "Nanoscale Tribology and Mechanics of MEMS/NEMS," Eight lectures in the course on "Microsystems Mechanical Design," Advanced School, **Centre International des Sciences Mecaniques**, Udine, Italy, June 28 - July 2, 2004.
25. "Nanoscale Tribology and Mechanics of MEMS/NEMS" (1-day course), Excellence Course for the Interpolytechnic Ph.D. School, **Politecnico di Milano**, Milan, Italy, July 6-7, 2004.
26. "Nanotribology and Nanomechanics" (1-day course), Short Courses on Micromachining and Microfabrication, **SPIE Photonics West**, San Jose, California, Jan. 23, 2005.
27. "Nanotribology and Nanomechanics and Applications to MEMS/NEMS and BioMEMS/BioNEMS" (1-day course), **Intel Corporation**, Santa Clara, California, Jan. 30, 2006.
28. "Nanotribology and Nanomechanics and Applications to MEMS/NEMS and BioMEMS/BioNEMS" (1-day course), **Max-Planck Institut fuer Metallforschung**, Stuttgart, Germany, Feb. 2, 2007.
29. "Nanotribology and Nanomechanics and Applications to MEMS/NEMS, BioMEMS/BioNEMS, and Biomimetics," Micro and Nano Science Platform (MNSP) Summer Course in Nanotechnology, **ETH, Zurich**, Switzerland, June 25, July 8, and July 15, 2007.
30. "Nanotribology and Nanomechanics and Applications to MEMS/NEMS, BioMEMS/BioNEMS, and Biomimetics" (1-day course), **17th International Vacuum Congress (IVC-17), 13th International Conference in Surface Science (ICSS-13), and International Conference on Nano Science and Technology (ICN+T 2007)**, Stockholm, Sweden, July 1, 2007.
31. "Nanotribology and Nanomechanics and Applications to MEMS/NEMS, BioMEMS/BioNEMS and Biomimetics (1-week course)," Instituto Alberto Luiz Coimbra de Posgraduacao e Pesquisa de Engenharia (COPPE), **Federal University of Rio de Janeiro**, Brazil (Funded by Brazilian Research Council), Dec. 2007.
32. "Nanotribology and Nanomechanics and Applications to MEMS/NEMS, BioMEMS/BioNEMS and Biomimetics (2-day course)," **Polytechnic School of the University of Sao Paulo**, Brazil, Dec. 2007.
33. "Nanotribology and Nanomechanics and Applications to MEMS/NEMS, BioMEMS/BioNEMS and Biomimetics (1-day course)," **SPIE Photonics West**, San Jose, California, Jan. 22, 2008.
34. "Nanotribology and Nanomechanics and Applications to MEMS/NEMS, BioMEMS/BioNEMS and Biomimetics (3-day course)," College of Engineering, **National University of Colombia**, Medellin, Colombia, (attended by more than 150 people from all over Colombia), Aug. 2008.
35. "Nanotribology and Nanomechanics and Applications to MEMS/NEMS, BioMEMS/BioNEMS and Biomimetics (3-day course)," College of Engineering, **Andes University** and College of Physics, **Distrital University**, Bogota, Colombia (attended by more than 100 people from all over Colombia), Aug. 2008.
36. "Nanotribology and Nanomechanics and Applications to MEMS/NEMS, BioMEMS/BioNEMS and Biomimetics (5-day course)," College on Engineering, **University of Ljubljana and Jozef Stefan Institute**, Ljubljana, Slovenia, June 2010.
37. "Nanotribology and Nanomechanics and Applications to MEMS/NEMS, BioMEMS/BioNEMS and Biomimetics (2-day course)," EU Seventh Framework Programme, Marie Curie Initial Training Networks, **Austrian Center of Competence for Tribology, Wiener Neustadt and Vienna University of Technology**, Austria, June-July 2010.
38. "Nanotribology and Nanomechanics and Applications to MEMS/NEMS, BioMEMS/BioNEMS and Biomimetics (1-day course)," Faculty of Engineering, **University of Kragujevac**, Kragujevac, Serbia, May 2012.
39. "Principles and Applications of Tribology (Accelerated 4-day (16 hours) course)," School of Mechatronics Engineering, **Harbin Institute of Technology**, Harbin, China, July 2012.
40. "Principles and Applications of Tribology (Accelerated 4-day (16 hours) course)," School of Mechatronics Engineering, **Harbin Institute of Technology**, Harbin, China, March 2013.

41. "Principles and Applications of Tribology (A Short Course)," State Key Laboratory for Tribology, **Tsinghua University**, Beijing, China, June 2013.
42. "Tribology Graduate Course (Guest Lectures)," Mechanical Engineering Department, **King Fahd University of Petroleum & Minerals**, Dhahran, Saudi Arabia, Dec. 2013.
43. "Principles and Applications of Tribology (Accelerated 4-day (16 hours) course)," School of Mechatronics Engineering, **Harbin Institute of Technology**, Harbin, China, Aug. 2014.
44. "Tribology Graduate Course (Guest Lectures)," Mechanical Engineering Department, **King Fahd University of Petroleum & Minerals**, Dec. 2014.
45. "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/Nanotechnology (1/2-day course)," **70th STLE Annual Meeting & Exposition**, Dallas, Texas, May 2015.
46. "Bio- & Nanotechnology and Biomimetics (1 week course)," Instituto Alberto Luiz Coimbra de Posgraduacao e Pesquisa de Engenharia (COPPE), **Federal University of Rio de Janeiro**, Brazil, June 2015.
47. "Bio- & Nanotechnology and Biomimetics (1-week national course)," Under the auspices of Global Initiative of Academic Networks (GIAN) in Higher Education by Government of India, **Indian Institute of Technology**, Ropar, India, Dec. 2016.
48. "Tribology and Nanotribology and Applications to Nanotechnology and Biomimetics (two days course)," LUBMAT 2018, Lubricants, Tribology and Condition Monitoring International Conference and Exhibition, **IK4-TEKNIKER**, San Sebastian, Spain, June 2018.
49. "Bio- & Nanotechnology and Biomimetics (2 weeks course)," School of Mechatronics Engineering, **Harbin Institute of Technology**, Harbin, China, July 2018.
50. "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology (1-day course)," **74th STLE Annual Meeting & Exposition**, Nashville, Tennessee, May 2019.
51. "Bio- & Nanotechnology and Biomimetics (2 weeks course)," School of Mechatronics Engineering, **Harbin Institute of Technology**, Harbin, China, June 2019.
52. "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology and Biomimetics," "Lessons from Nature: Bioinspired Mechanically Durable and Self-healing Superliquiphilic/phobic Surfaces," and "Bioinspired Water Harvesting from Fog and Condensation to Supplement Safe Water Supply," (Bioengineering Seminar Mini-Series), School of Engineering, School of Life Sciences, Institute of Bioengineering (IBI) and Institute of Chemical Sciences and Engineering, **Ecole Polytechnique Federale de Lausanne (EPFL)**, Lausanne, Switzerland, June 2022.

CURRICULUM DEVELOPMENT AT THE OHIO STATE UNIVERSITY

- | | |
|----------------|---|
| 1991-92 | Created a graduate curriculum in Principles and Applications of Tribology, in collaboration with Prof. B. J. Hamrock. The course covers mechanisms of friction, wear, and lubrication ranging from macro- to nanoscale that govern interfacial behavior; applications to friction and wear problems The curriculum consists of three courses. The courses have been offered since Fall 1991. |
| 2000-01 | <div style="margin-left: 40px;">ME 765/7765 Principles of Tribology</div> <p>Carried out major modifications in the design courses sequence for ME undergraduates in collaboration with Prof. Anthony Luscher.</p> <div style="margin-left: 40px;">ME 561 Fundamentals of Machine Elements</div> <div style="margin-left: 40px;">ME 562 Machine Elements I</div> <div style="margin-left: 40px;">ME 563 Machine Elements II</div> |
| 2003-05 | Created a graduate course on nanochemistry for nanotechnology in collaboration with Prof. James V. Coe of the Chemistry Department. This course addresses chemical issues of importance to Nanotechnology from an atomic and molecular perspective. The course has been offered since Spring 2005. |
| 2005-06 | <div style="margin-left: 40px;">CHEM 694 Chemistry for Nanotechnology</div> <p>Created a graduate course on nanotechnology and biomimetics. This course covers nanotechnology, nanocharacterization techniques, nanotribology and nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS materials and devices and an overview of biomimetics. The course has been offered since Spring 2006.</p> |

- 2015** Assisted in Creation of an Undergraduate Minor in Science, Engineering, Innovation, and Public Policy between College of Engineering and John Glenn College of Public Affairs (1/15).

RESEARCH FUNDING

- 1976-80 **NASA, U.S. Navy, Air Force, Department of Energy, DuPont, United Technology Corporation and Chrysler Corporation.**
- 1991- **Ohio Eminent Scholar and The Howard D. Winbigger Chair in Mechanical Systems**, The Ohio State University Endowment Fund (\$1.2 million). An income of about \$90,000/year for salary and research program support.
- 1991-94 **The Office of Research, Ohio State University**, \$75,000, Computer Microtribology and Contamination Laboratory Research Programs.
- 1991 **IBM Storage Systems Division**, San Jose, California and Rochester, Minnesota, \$90,000, Instrumentation and Equipment Donation.
- 1992 **IBM Research Division**, San Jose, California, \$60,000, Instrumentation and Equipment Donation.
- 1992 **Cincinnati Bell Comquest**, Cincinnati, Ohio, \$30,000;
Lotus Technology Corporation, San Jose, California, \$30,000;
Mechanical Technology Inc., Latham, New York, \$3,000;
Metrum Information Storage, Littleton, Colorado, \$60,000;
3M, St. Paul, Minnesota, \$8000;
The Stolle Corporation, Sidney, Ohio, \$60,000;
Storage Technology Corporation, Louisville, Colorado, \$30,000;
Tencor Instruments, Mountain View, California, \$2000.
- 1992 **Conner Peripherals**, San Jose, California, \$10,000, CMCL Industrial Membership.
- 1992-93 **Digital Instruments**, Santa Barbara, California, \$50,000, CMCL Industrial Membership Through Equipment Discount.
- 1992-93 **Lotus Technology Corporation**, San Jose, California, \$50,000, CMCL Industrial Membership Through Equipment Discount.
- 1992-93 **Storage Technology Corporation**, Louisville, Colorado, \$25,000, CMCL Industrial Membership.
- 1992-95 **Wyko Corporation**, Tucson, Arizona, \$100,000, CMCL Industrial Membership Through Equipment Discount.
- 1992-93 **Maxtor Corporation**, San Jose, California, \$30,000, CMCL Industrial Membership & Tribology of Disk Drives.
- 1993-94 **Hitachi Image and Media System Laboratory**, Yokohama, Japan, \$31,250, Tribology of Tape Drives.
- 1992-93 **National Science Foundation**, \$80,000, Research Equipment Grant for Purchase of a Nanoindenter. A matching grant of \$88,600 by The Ohio State University.
- 1992-93 **Center for Automotive Research, Ohio State University**, \$50,000, Development of Diamond Coatings for Reduction in Friction and Wear of Automotive Components. (Co-investigator: Prof. V. V. Subramaniam).
- 1992-95 **Office of Naval Research**, Arlington, Virginia, \$300,000, Development of Fundamental Understanding of Friction and Wear Mechanisms by Atomic-Scale Tribological Studies of Ceramic Materials and Multilayered Thin Films.
- 1993 **IBM Storage Systems Division**, San Jose, California, \$60,000, Instrumental and Equipment Donation.
- 1993-94 **Storage Technology Corporation**, Louisville, Colorado, \$25,000, CMCL Industrial Membership.
- 1993-94 **SI Diamond Technology Inc.**, Houston, Texas, \$25,000, CMCL Industrial Membership.
- 1993-94 **3M Audio & Video Technology Division**, Hutchinson, Minnesota, \$25,000, Tribology of Tape Drives.
- 1993-94 **Corning Inc.**, Corning, New York, \$50,000, CMCL Industrial Membership.
- 1993-95 **ARPA/NSIC**, Arlington, Virginia, \$384,000, Ultra-High Density Recording - Magnetic Tape Tribology.
- 1994-95 **ARPA/NSIC**, Arlington, Virginia, \$64,850, Ultra-High Density Recording - Magnetic Disk Tribology.

1994-95 **Storage Technology Corporation**, Louisville, Colorado, \$50,000, CMCL Industrial Membership & Overcoats for Tape Drive Heads.

1994-95 **Corning Inc.**, Corning, New York, \$75,000, CMCL Industrial Membership & Surface Optimization of Glass Ceramic Substrates for Rigid Disk Drives.

1994-95 **Aiwa R&D, Inc.**, Fremont, California, \$25,000, CMCL Industrial Membership.

1994-95 **3M Audio/Video Products Div.**, St. Paul, Minnesota, \$25,000, Video Tape Head Wear Studies.

1994-95 **Digital Instruments**, Santa Barbara, California, \$35,000, CMCL Industrial Membership Through Equipment Donation.

1995 **Hysitron Inc.**, Minneapolis, Minnesota, \$30,000, CMCL Industrial Membership Through Equipment Donation.

1995-96 **Storage Technology Corporation**, Louisville, Colorado, \$50,000, CMCL Industrial Membership & Overcoats for Tape Heads.

1995-96 **Owens-Corning Science & Technology Center**, Granville, Ohio, \$25,000, Micromechanical Characterization of Glass Fibers.

1995-99 **Office of Naval Research**, Arlington, Virginia, \$300,000, Nanotribological Studies of Bulk Ceramic Materials, Multilayered Thin Films, and Liquid Lubricant Films.

1995-00 **National Institute of Standards and Technology, Gaithersburg, Maryland**, \$583,000, Advanced Technology Program (ATP) on High Performance Variable Data Rate Multi-Media Tape Recorder - Project Administered by 3M/Imation Inc./Adv. Research Corp./Peregrine Recording Tech./StorageTek/SSESCO.

1995-96 **NATO Scientific and Environmental Affairs Division, Brussels, Belgium**, \$85,000, NATO-Advanced Study Institute Course on Micro/Nanotribology and its Applications, Sesimbra, Portugal, June 16-28, 1996 (ASI Director).

1996 **Office of Naval Research**, Arlington, Virginia, \$15,000, Travel Support to NATO-Advanced Study Institute (Sesimbra, Portugal, June 16-28, 1996).

1996 **IBM Storage Systems Division**, San Jose, California, \$70,000, Instrumentation and Equipment Donation.

1996-97 **National Science Foundation**, Arlington, Virginia, \$10,000, Travel Support to NATO-Advanced Study Institute (Sesimbra, Portugal, June 16-28, 1996).

1996-97 **Quantegy Inc.**, Opelika, Alabama, \$25,000. CMCL Industrial Membership & Stiction Analysis of Magnetic Tapes.

1996-97 **Storage Technology Corporation**, Louisville, Colorado, \$50,000, CMCL Industrial Membership & Tape Debris Studies in Linear Tape Drives.

1996-99 **The Ohio Board of Regents Investment Fund**, Columbus, Ohio, \$220,000, University Laboratories in Tribology Research and Applications (Total award of \$1.24 million to five Ohio Universities).

1997-98 **National Science Foundation**, Arlington, Virginia, \$40,000, Workshop on Tribology Issues and Opportunities in MEMS, Columbus, Ohio Nov. 9-11, 1997.

1997-98 **Air Force Office of Scientific Research**, Bolling AFB, DC, \$5,000, Workshop on Tribology Issues and Opportunities in MEMS, Columbus, Ohio Nov. 9-11, 1997.

1997-98 **Storage Technology Corporation**, Louisville, Colorado, \$50,000, CMCL Industrial Membership & Tape Debris Studies in Linear Tape Drives.

1997-98 **Sony Corporation Research Center**, Yokohama, Japan, \$25,000, CMCL Industrial Membership.

1997-98 **Quantum**, Thin Film Head Group, Shrewsbury, Massachusetts, \$50,000, CMCL Industrial Membership & Overcoats for Disk Heads.

1997-98 **Quantum**, DLT Group, Milpitas, California, \$75,000, CMCL Industrial Membership & Tribology of DLT Tape Drives.

1997-98 **Quantum**, Head/Media Failure Analysis Group, Milpitas, California, \$25,000, CMCL Industrial Membership & Analysis of Drive-Level Contaminant Particles in Rigid Disk Drives.

1998-99 **Quantum**, Thin Film Head Group, Shrewsbury, Massachusetts, \$50,000, CMCL Industrial Membership & Overcoats for Disk Heads.

1998-99 **Quantum**, Head/Media Failure Analysis Group, Milpitas, California, \$25,000, CMCL Industrial Membership & Particulate Contamination Studies in Rigid Disk Drives.

1998-99 **Sony Corporation Research Center**, Yokohama, Japan, \$25,000, CMCL Industrial Membership.

1998-99 **Storage Technology Corporation**, Louisville, Colorado, \$50,000, CMCL Industrial Membership & Effect of Types of Sliders on Wear and PTR in Tape Drives.

1998-99 **Imation**, Oakdale, Minnesota/**Storage Technology Corporation**, Louisville, Colorado, \$50,000, Analysis of Engineered Back Coats for Advanced Data Cartridges.

1998-99 **Quantum, DLT Group**, Milpitas, California, \$75,000, Tribology of DLT Tape Drives.

1999-01 **State Committee for Science**, Warsaw, Poland, \$10,000, Scientific and Technological Cooperation Joint Project.

1999-00 **Sony Corporation Research Center**, Yokohama, Japan, \$25,000, CMCL Industrial Membership.

1999-00 **Storage Technology Corporation**, Louisville, Colorado, \$50,000, CMCL Industrial Membership & Effect of Head Structure on Wear and PTR of Tape Heads.

1999-00 **Toray Industries**, Shiga, Japan, \$100,000, CMCL Industrial Membership & Characterization of Polymeric Substrates.

1999-00 **Quantum**, Milpitas, California, \$50,000, CMCL Industrial Membership.

1999-00 **Imation Corp.**, Oakdale, Minnesota, \$50,000, CMCL Industrial Membership.

1999-02 **National Science Foundation**, Arlington, Virginia, \$240,000, Reliability of MEMS Materials and Components.

1999-02 **National Science Foundation**, Arlington, Virginia and the **German Academic Exchange Service (DADD)**, Germany, \$17,000, U.S. – Germany Cooperative Research: Ultrasonic Force and Friction Force Microscopy Applied to Thin Films for Magnetic Storage Media.

2000-02 **National Science Foundation**, Arlington, Virginia, \$89,900, Lubricant Film Thickness Mapping Using a Scanning Capacitance Technique with a Nanoscale Lateral Resolution; \$10,000, Research Experience for Undergraduates (REU) supplemental grant.

2000 **National Science Foundation**, Arlington, Virginia, \$15,000, Travel Support to NATO-Advanced Study Institute (Keszthely, Hungary, Aug. 13-25, 2000).

2000-01 **Teijin Limited**, Sagamihara, Japan, \$75,000, CMCL Industrial Membership and Dimensional Stability of Polymeric Substrates.

2000-01 **Imation Corp.**, Oakdale, Minnesota, \$50,000, CMCL Industrial Membership.

2000-01 **Quantum**, Schrewsbury, Massachusetts, \$50,000, CMCL Industrial Membership.

2001 **Digital Instruments**, Santa Barbara, California, \$150,000, NLIM Industrial Membership Through Equipment Donation.

2001-02 **Toray Industries**, Shiga, Japan, \$75,000, CMCL Industrial Membership & Characterization of Polymeric Substrates.

2001-02 **Imation Corp.**, Oakdale, Minnesota, \$50,000, NLIM Industrial Membership.

2001-02 **Teijin Limited**, Sagamihara, Japan, \$75,000, NLIM Industrial Membership and Dimensional Stability of Polymeric Substrates.

2001-02 **Sony Corporation**, Sendai, Japan, \$25,000 NLIM Industrial Membership.

2001-04 **National Institute of Standards and Technology**, Gaithersburg, Maryland, \$291,000, A Novel UHV Tribo-Apparatus and Modifications of Atomic Force Microscope for Applications to Micro/Nanoscale Devices.

2002-03 **Texas Instruments**, Dallas, Texas, \$50,000, NLIM Industrial Membership and Nanotribological and Nanomechanical Characterization of DLP Components.

2002-03 **Imation Corp.**, Oakdale, Minnesota, \$50,000, NLIM Industrial Membership.

2002-03 **Imation Corp.**, Oakdale, Minnesota, \$78,000, Tribology of Head-Tape Interface in LTO Tape Drives.

2002-03 **Sony Corporation**, Sendai, Japan, \$25,000, NLIM Industrial Membership.

2002-03 **Toray Industries**, Shiga, Japan, \$25,000, NLIM Industrial Membership.

2002-04 **National Science Foundation**, Arlington, Virginia, \$99,900, Use of Phase Imaging in Atomic Force Microscopy for Measurement of Viscoelastic Contrast in Polymer Nanocomposites and Molecularly-Thick Lubricant Films.

2002-05 **National Institute of Standards and Technology, Gaithersburg, Maryland**, \$400,000, Advanced Technology Program (ATP) on Multi-Terabyte Tape Storage - Project Administered by Imation Inc./Accutronics/Mountain Eng./Adv. Research Corp./Peregrine Recording Tech.

2003-07 **National Science Foundation**, Arlington, Virginia, \$270,000, Development, Characterization, and Application of Advanced Coatings for Improving Reliability of MEMS/NEMS Devices.

2003-04 **The Procter & Gamble Company**, Cincinnati, Ohio, \$50,000, NLIM Industrial Membership and Nanotribological and Nanomechanical Characterization of Human Hair.

2003-04 **Imation Corp.**, Oakdale, Minnesota, \$50,000, NLIM Industrial Membership.

2003-04 **Toray Industries**, Shiga, Japan, \$25,000, NLIM Industrial Membership.

2003-04 **Sony Corporation**, Sendai, Japan, \$25,000, NLIM Industrial Membership.

2003-05 **Jiangsu Provincial Government**, China, \$12,000 (100,000 RMB), The Magneto-Electric Effect on the MEMS Tribological Behavior (with Prof. Shirong Ge, China University of Mining and Technology, Xuzhou, China).

- 2004-06 **National Science Foundation**, Arlington, Virginia, \$420,000, Development of an Automated Visually Guided AFM System for Multiscale Imaging and Manipulation of Biological and Engineering Systems (with Co-PIs Profs. C.H. Menq, K. Srinivasan, S. Jhiang, and J. Robinson).
- 2004-05 **The Procter & Gamble Company**, Cincinnati, Ohio, \$50,000, NLIM Industrial Membership and Nanotribological and Nanomechanical Characterization of Human Hair.
- 2004-05 **The Procter & Gamble Far East Inc.**, Kobe, Japan, \$50,000, NLIM Industrial Membership and Nanotribological and Nanomechanical Characterization of Human Hair.
- 2004-05 **Sony Corporation**, Sendai, Japan, \$25,000, NLIM Industrial Membership.
- 2004-05 **Imation Corporation**, Oakdale, Minnesota, \$50,000, NLIM Industrial Membership.
- 2004-05 **Veeco Metrology Group/Digital Instruments**, Santa Barbara, California, \$25,000, NLIM Industrial Membership.
- 2005-06 **The Procter & Gamble Company**, Cincinnati, Ohio, \$50,000, NLIM Industrial Membership and Nanotribological and Nanomechanical Characterization of Human Hair.
- 2005-06 **Imation Corporation**, Oakdale, Minnesota, \$50,000, NLIM Industrial Membership.
- 2005-06 **Sony Corporation**, Sendai, Japan, \$25,000, NLIM Industrial Membership.
- 2006-07 **The Procter & Gamble Company**, Cincinnati, Ohio, \$25,000, NLIM Industrial Membership and Nanotribological and Nanomechanical Characterization of Human Hair.
- 2006 **Imation Corporation**, Oakdale, Minnesota, \$20,000, NLIM Industrial Membership and Study of Tribological Properties and Degradation of Novel Lubricants on Magnetic Tape Substrate.
- 2006 **Intel Corporation**, Santa Clara, California, \$48,000, NLIM Industrial Membership and Nanotribological Studies of Coated AFM Probes for Probe-Based Data Storage.
- 2006-07 **NanoChip Inc.**, Fremont, California, \$29,000, NLIM Industrial Membership and Nanotribological Studies of Coated AFM Probes for Probe-Based Data Storage.
- 2006-07 **Imation Corporation**, Oakdale, Minnesota, \$50,000, NLIM Industrial Membership.
- 2006-07 **Air Force Office of Scientific Research**, Arlington, Virginia and **Surfaces Research**, Lenexa, Kansas (STTR Phase II), \$125,000, NLIM Industrial Membership and Nanotribological Studies of Ionic Liquid Lubricants.
- 2007-08 **NanoChip, Inc.**, Fremont, California, \$75,000, NLIM Industrial Membership and Nanotribological Studies of Coated AFM Probes for Probe-Based Data Storage.
- 2008-09 **Information Storage Industry Consortium (INSIC)**, San Diego, California/ **Hewlett Packard**, Boise, Idaho/ **Quantum Corporation**, Boulder, Colorado; \$65,000, NLBB Industrial Membership and Tribological Properties and Degradation of Novel Lubricants for Magnetic Tapes.
- 2008-12 **European Union, Seventh Framework Programme**, Brussels, Belgium, Marie Curie Initial Training Networks (ITN), 3 Million Euros, Mechanisms of Interactions in Nano-scale of Novel Ionic Lubricants with Functional Surfaces (MINILUBES), with 13 partners, and coordinated by Austrian Center of Competence for Tribology (AC²T), Wiener Neustadt, Austria.
- 2008-11 **CNRS**, France – International Scientific Collaboration Project (PICS), 24,000 Euros, Functionalization of Carbon Nanotube Probes with Genetically Engineered Peptides (BIOTIP), with 4 partners in the U.S. and France, and coordinated by University of Bordeaux I, France.
- 2008-09 **Interdisciplinary Materials Research Grant – Energy Storage**, OSU, Columbus, OH, \$45,000, Multi-scale Characterization of Battery Materials for Improved Performance (Co-PIs with Profs. S. Babu, Y. Guezennec, and G. Rizzoni).
- 2009 **Institute for Materials Research Facilities Grant**, OSU, Columbus, OH, \$2,000, Characterization of Multivalent Ionic Liquids for Nanolubrication.
- 2008-11 **Ohio State University, College of Dentistry**, Columbus, OH, \$150,000, Evaluating the Biocompatibility of Nanostructured Polymers with Atomic Force Microscopy (AFM) (with Co-PI Prof. S. Schricker).
- 2009-10 **Corning, Inc.**, Corning, New York, \$131,500, NLBB Industrial Membership and Nanotribological Studies of Adaptive Optics Components in Microprojectors.
- 2010 **Taiho Kogyo Tribology Research Foundation (TTRF)**, Japan, \$24,000, Multivalent Ionic Liquids for Industrial Tribology Applications.
- 2010-11 **Interdisciplinary Materials Research Grant – Energy Storage**, OSU, Columbus, OH, \$45,000, Multi-scale Characterization of Battery Materials for Improved Performance – Phase II (Co-PIs with Profs. S. Babu, Y. Guezennec, and G. Rizzoni).
- 2010-14 **Austrian Research Foundation**, Vienna Austria, 50 Million Euros, COMET, European Excellence Center of Tribology, with over 50 partners, and coordinated by Austrian Center of Competence for Tribology (AC²T), Wiener Neustadt, Austria.

2010-11 **Institute for Materials Research Facilities Grant**, OSU, Columbus, OH, \$2,000, Fabrication and Characteristics of Biomimetic Superoleophobic Surfaces.

2010-11 **Revalerio, Inc.**, Tacoma, Washington, \$56,500, NLBB Industrial Membership and AFM Characterization of Biologically Active Electrokinetically-Altered Fluids.

2010-11 **Institute for Materials Research Facilities Grant**, OSU, Columbus, OH, \$2,000, Characterization of Protein-Block Copolymer Interactions for Biomaterials Development.

2010-14 **National Science Foundation**, Arlington, Virginia, \$300,000, Mechanically Reliable Surfaces for Superhydrophobicity, Self-Cleaning and Drag Reduction.

2011-16 **Department of Energy**, Washington, DC, \$25 Million with consortium of ten universities, national labs, and companies (OSU share \$3 Million), CERC-CV: US-China Clean Energy Research Center for Clean Vehicles, (Co-PIs with Profs. Giorgio Rizzoni, Joseph Heremans, Sudarasanam Babu, Yann Guezennec, Ramteen Sioshansi, Glenn Daehn, Jose Castro, Longya Xu, Jin Wang, and Junmin Wang).

2010-15 **State of Ohio**, Third Frontier Grant, \$645k, CERC-CV: US-China Clean Energy Research Center for Clean Vehicles, Battery Thrust (Co-PIs with Profs. Giorgio Rizzoni, Lei Cao, Joseph Heremans).

2011-12 **Revalerio, Inc.**, Tacoma, Washington, \$50,000, NLBB Industrial Membership and AFM Characterization of Biologically Active Electrokinetically-Altered Fluids.

2012 **Institute for Materials Research Facilities Grant**, OSU, Columbus, OH, \$2,000, Nanoscale Tribocharging Mechanism and Mechanical Properties Investigation of Novel Organic and Inorganic Nano-Object-Petroleum Hybrid Lubricants.

2012-13 **The OSU Center for Clinical and Translational Science (CCTS) Pilot & Collaborative Studies Program**, Columbus, OH, \$16,875, Bioinspired Nanofibers for Novel Maxillofacial Prosthetic Adhesives.

2012-13 **The Procter & Gamble Company**, Cincinnati, Ohio, \$112,500, Life Prediction for Tooling and Mold Materials Interacting with Softer Materials, Including Semi-Crystalline Polymer Materials.

2012-13 **Sony Chemical & Information Device Corporation**, Tochigi, Japan, \$100,000, Durable Anti-Smudge, Self-Cleaning, and Antifouling Display Screens.

2012-15 **American Chemical Society Petroleum Research Fund**, Washington, DC, \$100,000, Nanoscale Tribocharging Mechanism and Mechanical Properties Investigation of Novel Organic and Inorganic Nano-object-petroleum Hybrid Lubricants.

2013-14 **The Procter & Gamble Company**, Cincinnati, Ohio, \$112,500, Life Prediction for Tooling and Mold Materials Interacting with Softer Materials, Including Semi-Crystalline Polymer Materials.

2013-14 **The Procter & Gamble Company**, Cincinnati, Ohio, \$99,000, Friction Characterization of Various Polymeric Pairs.

2013-14 **Dexerials Corporation**, Tochigi, Japan, \$100,000, Durable Anti-Smudge, Self-Cleaning, and Antifouling Display Screens.

2013-14 **KFUPM**, Saudi Arabia, SR 60,000, Laser Treatment of Pre-prepared H188 alloy: Microstructure and Wear characteristics of the surface, Co-PI Prof. Bekir Yilbas et al., Project # IN 121044.

2014-15 **KFUPM**, Saudi Arabia, SR 62,000, HVOF Spraying of Carbide Blended Powders on Steel Surfaces: Metallurgical Characterization and Wear Analysis, Co-PI Prof. Bekir Yilbas et al., Project # SB 131007.

2013-15 **National Science, Technology and Innovation Plan (NSTIP)**, Kingdom of Saudi Arabia, 2 M SR, Novel Integrated NC Instrument Development for Nanometre Scale Research Applications, Co-PI, S. N. Mekid et al., Project # 12-NAN-3012-04.

2014-15 **Bruker Nano Surfaces Division**, Campbell, California, \$140,000, NLBB Industrial Membership.

2014-15 **USAID**, Washington, D.C., \$12,000, Bench fees to host an Egyptian Visiting Scholar.

2014-15 **Institute for Materials Research Facilities Grant**, OSU, Columbus, OH, \$2,000, Probing the Aging Effects on Nanomechanical Properties of Thin Film LiFePO₄ Li-ion Batteries.

2014-15 **The Procter & Gamble Company**, Cincinnati, Ohio, \$125,000, Friction Characterization of Various Polymeric Pairs.

2016-17 **Honda R & D Americas Inc.**, Raymond, Ohio, \$150,000, Bioinspired Mechanically Durable Self-Cleaning, Anti-Smudge, Antifouling, and Transparent/Antireflective Surfaces.

2016-17 **Corning, Inc.**, Corning, New York, \$35,000, NLBB Industrial Membership

2016-17 **OSU Accelerator Award**, Columbus, Ohio, \$49,300, "Superoleophobic Polymer Surfaces Prepared by Nanoparticle Incorporation."

2016-17 **Consolidated Edison Company of New York, Inc.**, New York, NY, \$50,000, "Oil/Water Separation Mesh Samples."

- 2017-19 **Ford Motor Company, Research and Advanced Engineering**, Dearborn, Michigan, \$180,000, "Superhydrophobic/philic Bipolar Plate Surfaces."
- 2017-19 **OSU Center for Applied Plant Sciences (CAPS)**, Columbus, Ohio, \$75,000, "Strategy for Bioinspired Multifunctional Materials for Collection of Water from Fog."

CONSULTANCY TO COMPANIES

- 1973-76 **Automotive Specialists**, Denver, Colorado
- 1991 **Zygo Corporation**, Middlefield, Connecticut
- 1991 **Eastman Kodak Co.**, Rochester, New York
- 1991 **Iomega Corp.**, Roy, Utah
- 1991-98 **Storage Technology Corp.**, Louisville, Colorado
- 1991-96 **3M Data Storage Products Div.**, St. Paul, Minnesota
- 1992-95 **3M Consumer and Professional Video and Audio Technology Div.**, St. Paul, Minnesota
- 1992 **Censtor**, San Jose, California
- 1992 **Dow Corning Corp.**, Midland, Michigan
- 1992-95 **Conner Peripherals Disk Div.**, Milpitas, California
- 1992 **Metrum Information Storage**, Littleton, Colorado
- 1993 **Wyle Industries**, El Segundo, California
- 1993 **SI Diamond Technology**, Houston, Texas
- 1993-95 **Corning Inc.**, Corning, New York
- 1994-98 **Aiwa R&D Inc.**, Fremont, California
- 1994 **Read-Rite Corp.**, Milpitas, California
- 1995 **Exclusive Design Company Inc.**, Fremont, California
- 1995-97 **Seagate Technology**, Bloomington, Minnesota
- 1996 **Philips Research Lab.**, Eindhoven, Netherlands
- 1996 **Cabot Corp.**, Aurora, Illinois
- 1996-97 **Quantegy Inc.**, Opelika, Alabama
- 1996 **Exabyte Corp.**, Boulder, Colorado
- 1996 **Silicon Light Machines**, Sunnyvale, California
- 1996-01 **Imation Corp.**, St. Paul, Minnesota
- 1997 **Lucent Technologies Bell Labs**, Whippany, New Jersey
- 1997 **Hewlett-Packard Company**, Boise, Idaho
- 1997-03 **Quantum**, Shrewsbury, Massachusetts
- 1998 **Polaroid Corporation**, Cambridge, Massachusetts
- 1998 **Toray Industries Inc.**, Shiga, Japan
- 1999 **Onix Microsystems Inc.**, Emeryville, California
- 2001 **Reflectivity Inc.**, Santa Clara, California
- 2002-05 **L'Oreal Research**, Paris, France
- 2002 **Texas Instruments Inc.**, Plano, Texas
- 2002 **Dow Chemical Co.**, Midland, Michigan
- 2003 **Proctor & Gamble Co.**, Cincinnati, Ohio
- 2004 **Proctor & Gamble, Co.**, Kobe, Japan
- 2003, 06 **Siemens Diesel Systems Technology**, Blythewood, South Carolina
- 2003 **Samsung Information System Div.**, San Jose, California
- 2004-05 **ChevronTexaco**, USA
- 2004-05 **Veeco Metrology Group**, Santa Barbara, California
- 2005 **Nanochip, Inc.**, Fremont, California
- 2006 **Intel Corp.**, Santa Clara, California
- 2006 **European Aeronautic Defence and Space (EADS) Company**, Munich, Germany
- 2006 **Ford Motor Company**, Dearborn, Michigan
- 2009-10 **MicroMed Cardiovascular**, Houston, Texas
- 2009-14 **Corning Inc.**, Corning, New York
- 2009-12 **Technova Corp.**, Okemos, Michigan
- 2009 **Ashland Aqualon**, Wilmington, Delaware
- 2010 **Unilever R&D**, Trumbull, Connecticut
- 2011 **Lubrizol Corp.**, Cleveland, Ohio

2013 **Tenneco Inc.**, Monroe, Michigan
 2016-18 **Raytheon Missile Systems**, Tucson, Arizona
 2019-20 **Technology in Practice**, Phelan, California
 2020- **MAST Biosurgery**, San Diego, California and **BvW Holding AG**, Cham, Switzerland

CORPORATE TECHNICAL ADVISORY BOARD MEMBERSHIP

1996-97 **Telonix Microwave Industries**, Columbus, Ohio, Member, Technical Advisory Board

RESEARCH INSTITUTES ADVISORY BOARD MEMBERSHIP

2004- **Austrian Center of Competence for Tribology (AC²T)**, Wiener Neustadt, Austria, Member, International Advisory Board
 2009-12 **PRISM – NNSA Center for Prediction of Reliability, Integrity and Survivability of Microsystems**, Purdue University, West Lafayette, Indiana, Member, External Advisory Board.
 2011-12 **National Nanotechnology Center for Energy (CNNe)**, Medellin, Colombia, Member, International Advisory Board.
 2015-16 **Brazilian National Nanotechnology Laboratory (LNNano)**, Campinas, Brazil, Member, International Advisory Board.
 2016- **DK NanoCell – Doctoral College on Nano-Analytics of Cellular Systems**, Johannes Kepler University, Linz, Austria, Member, Advisory Board

SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

Arizona State University

1982-85 *S. Chandrasekar*, “Comparison of Residual Stresses Induced when Grinding and Lapping Ferrites and Metals,” Ph.D. Thesis, Department of Mechanical Engineering, Arizona State University, Tempe, AZ. (Coadvised with Prof. M. C. Shaw.)

Northwestern University

1987-89 *Michael T. Dugger*, “Friction, Wear and Interfacial Chemistry in Thin-Film Magnetic Rigid Disk Files,” Ph.D. Thesis, Department of Materials Science and Engineering, Northwestern University, Evanston, IL. (Coadvised with Prof. Y. W. Chung.)

University of California at Berkeley/Lawrence Berkeley Laboratory

1989-90 *Jeffrey L. Streater*, “The Friction and Lubrication of Thin Film Disks with Carbon Overcoat,” Ph.D. Thesis, Department of Mechanical Engineering, University of California, Berkeley, CA. (Coadvised with Prof. D. B. Bogy.)
 1989-90 *Dr. May-Ying Chu*, “Processing of Diamond/Alumina Composites for Low Wear Applications,” postdoctoral fellow, Department of Materials Science and Minerals Engineering, University of California, Berkeley, CA.
 1989-90 *Dr. Nam-Hee Cho*, “Chemical Structure and Physical Properties of Diamond-Like Amorphous Carbon Films Prepared by Magnetron Sputtering,” postdoctoral fellow, National Center for Electron Microscopy and Center for Advanced Materials, Lawrence Berkeley Laboratory, Berkeley, CA.

Ohio State University

Ph.D. Theses Completed

1. *Vilas N. Koinkar*, “Micro/Nanotribology and its Applications to Magnetic Media, Heads and MEMS,” Ph.D. Thesis, One-of-A-Kind Ph.D. Program in Micro/Nanotribology, Nov. 1996.
2. *Steven T. Patton*, “Tribology of Advanced Magnetic Tapes for Ultrahigh-Density Magnetic Recording,” Ph.D. Thesis, Dept. of Physics, March 1998.
3. *Sameera K. Chilamakuri*, “Contact Analyses of Random and Patterned Surfaces,” Ph.D. Thesis, Dept. of Mech. Eng., Nov. 1998.
4. *William W. Scott*, “Micro/Nanoscale Differential Wear and Corrosion of Multiphase Materials,” Ph.D. Thesis, Dept. of Mech. Eng., June 2001.
5. *Wei Peng*, “Contact Mechanics of Multilayered Rough Surfaces in Tribology,” Ph.D. Thesis, Dept. of Mech. Eng., Sept. 2001.

6. *Sriram Sundararajan*, "Micro/Nanoscale Tribology and Mechanics of Components and Coatings for MEMS," Ph.D. Thesis, Dept. of Mech. Eng., Nov. 2001.
7. *David T. Lee*, "Electrical Characterization of Thin Dielectric Films," Ph.D. Thesis, Physics Department, May 2002. (Coadvised with Prof. Jonathan P. Pelz.)
8. *Anton V. Goldade*, "Micro/Nanoscale Tribology of Linear Tape Drives," Ph.D. Thesis, Dept. of Mech. Eng., Sept. 2003.
9. *Nikhil S. Tambe*, "Nanotribological Investigations of Materials, Coatings, and Lubricants for Nanotechnology Applications at High Sliding Velocities," Ph.D. Thesis, Dept. of Mech. Eng., March 2005.
10. *Shaobiao Cai*, "3D Numerical Modeling of Dry/Wet Contact Mechanics for Rough, Multilayered Elastic-Plastic Solid Surfaces and Effects of Hydrophilicity/Hydrophobicity During Separation with Applications," Ph.D. Thesis, Dept. of Mech. Eng., Feb. 2008.
11. *Yong Chae Jung*, "Natural and Biomimetic Artificial Surfaces for Superhydrophobicity, Self-Cleaning, Low Adhesion, and Drag Reduction," Ph.D. Thesis, Dept. of Mech. Eng., Nov. 2009.
12. *Shrikant C. Nagpure*, "Multi-scale Characterization Studies of Aged Li-ion Battery Materials for Improved Performance," Ph.D. Thesis, Dept. of Mech. and Aerospace Eng., Dec. 2011.
13. *Gregory D. Bixler*, "Bioinspired Surface for Low Drag, Self-Cleaning, and Antifouling: Shark Skin, Butterfly and Rice Leaf Effects," Ph.D. Thesis, Dept. of Mech. and Aerospace Eng., Dec. 2013.
14. *Dave Maharaj*, "Friction, Wear and Mechanical Behavior of Nano-Objects on the Nanoscale," Ph.D. Thesis, Dept. of Mech. and Aerospace Eng., Dec. 2014.
15. *Daniel R. Ebert*, "Superhydrophobic, Biomimetic Surfaces with High and Low Adhesion, Optical Transmittance, and Nanoscale Mechanical Wear Resistance," Ph.D. Thesis, Dept. of Mech. and Aerospace Eng., Sept. 2016.
16. *Samuel G. Martin*, "Bioinspired Surfaces Adapted from Lotus Leaves for Superliquiphobic Properties," Ph.D. Thesis, Dept. of Mech. and Aerospace Eng., Aug. 2017.
17. *Dev Gurera*, "Bioinspired Surfaces: Water Harvesting and Gas Bubbles Movement," Ph.D. Thesis, Dept. of Mech. and Aerospace Eng., Aug. 2020.

M.S. Theses Completed

1. *Suryaprakash Ganti*, "Generalized Fractal Analysis and its Applications to Engineering Surfaces," M.S. Thesis, Dept. of Mech. Eng., Nov. 1993.
2. *John A. Monahan*, "Accelerated Friction and Wear Studies of Various Particulate and Thin-Film Magnetic Tapes Against Tape Path Materials in Pure Sliding and Rotary/Sliding Modes," M.S. Thesis, Dept. of Mech. Eng., May, 1994.
3. *John A. Lowry*, "Friction and Wear Studies of Ultra-High Density Magnetic Tapes and Various Head Materials Using a New Nano-Scratch Wear Measurement Technique," M.S. Thesis, Dept. of Mech. Eng., August 1994.
4. *Darshan A. Khatavkar*, "Role of Tape Abrasivity and Environment on the Tribological Behavior of Particulate Tapes," M.S. Thesis, Dept. of Mech. Eng., June 1995.
5. *Chetan A. Kotwal*, "Modelling of Contact and Stiction for Magnetic Disk Drives" M.S. Thesis, Dept. of Mech. Eng., Nov. 1995.
6. *Reid M. Anderson*, "Mechanism of Dropouts using Measurement of in-situ Friction Force in Rotary-Head Tape Drives," M.S. Thesis, Dept. of Mech. Eng., Sept. 1996.
7. *Ashok V. Kulkarni*, "Friction and Mechanical Characterization on Nanoscale using Atomic/Force Microscopy," M.S. Thesis, Dept. of Mech. Eng., Oct. 1996.
8. *Scott M. Forehand*, "In-situ Measurements of Localized Wear in Magnetic Thin-Film Rigid Disks," M.S. Thesis, Dept. of Mech. Eng., Nov. 1996.
9. *William W. Scott*, "Investigation of Issues Involving Spacing Loss at the Magnetic Head-Tape Interface," M.S. Thesis, Dept. of Mech. Eng., Oct. 1997.
10. *Sriram Sundararajan*, "Micro/Nanotribological Studies Using an Atomic Force/Friction Force Microscope," M.S. Thesis, Dept. of Mech. Eng., Oct. 1997.
11. *Derik C. DeVecchio*, "Using an Atomic Force Microscope for Measuring Mechanical and Tribological Properties of Thin Films and Surfaces," M.S. Thesis, Dept. of Materials Science and Eng., May 1998.
12. *Christopher D. Hahm*, "High Shear Rate Viscosity Measurements and Lubricant Film Thickness Mapping Using a Capacitance Technique," M.S. Thesis, Dept. of Mech. Eng., June 1998.
13. *Allan Luk*, "Durability and Failure Mechanisms of Digital Tapes in a Rotary Tape Drive," M.S. Thesis, Dept. of Mech. Eng., Aug. 1999.

14. *Chetan Dandavate*, "Thin-Film Friction and Adhesion Studies Using Atomic Force Microscopy," M.S. Thesis, Dept. of Mech. Eng., Aug. 1999.
15. *Micah Kattner*, "Analysis of Stain Formation and Wear Mechanisms for Metal Particle and Cobalt Doped Gamma Iron Oxide Tape Against Magnetoresistive Heads in a Linear Tape Drive," M.S. Thesis, Dept. of Mech. Eng., Jan. 2000.
16. *Jeffrey J. Topoleski*, "Magnetic and Tribological Evaluation of MP and ME Magnetic Tapes in a Linear Tape Drive," M.S. Thesis, Dept. of Mech. Eng., March 2000.
17. *Paritosh P. Ambekar*, "Effect of Head Stepping, Tape Substrate Thickness and Operating Environment on Head-Tape Interface in a Linear Tape Drive," M. S. Thesis, Dept. of Mech. Eng., July 2002.
18. *Nikhil S. Tambe*, "Friction/Stiction and Durability of Load/Unload Picosliders and Padded Picosliders in Rigid Disk Drives," M. S. Thesis, Dept. of Mech. Eng., July 2002.
19. *Ravichander Jayantha-Rao*, "Dimensional Stability and Durability Studies of Magnetic Tapes," M.S. Thesis, Dept. of Mech. Eng., Nov. 2003.
20. *Sriman Venkatesan*, "Effective Mechanical Properties of Layered Rough Surfaces," M.S. Thesis, Dept. of Mech. Eng., Dec. 2003.
21. *Steven M. McDonough*, "Comparative Analysis and Associated Failure Mechanisms of Magnetic Media in Advanced Linear Tape Drives," M.S. Thesis, Dept. of Mech. Eng., June 2004.
22. *Walter S. Hansen*, "Effects of Operating Speed and Tension and Sources of Lateral Tape Motion in a Linear Tape Drive and Measurement and Mechanism of Pole Tip Recession with Advanced Metal Evaporated Tape in a Linear Tape Drive," M.S. Thesis, Dept. of Mech. Eng., Sept. 2004.
23. *John M. Boyle, Jr.*, "Measurement and Modeling of Vibration Response Due to Lateral Tape Motion in a Linear Tape Drive," M.S. Thesis, Dept. of Mech. Eng., Sept. 2004.
24. *Shashank Aggarwal*, "Finite Element Analysis of the Magnetic Tape Slitting Process," M.S. Thesis, Dept. of Mech. Eng., Sept. 2004.
25. *Kang Kug Lee*, "Surface Modification of Silicon and PDMS Surfaces with Vapor Phase Deposited Ultrathin Fluoropolymer and Fluorosilane Films for Biomedical Micro/Nanoelectromechanical System Applications," M.S. Thesis, Dept. of Mech. Eng., March 2005.
26. *Carmen LaTorre*, "Nanotribological Characterization of Human Hair and Skin Using Atomic Force Microscopy (AFM)," M.S. Thesis, Dept. of Mech. Eng., June 2005.
27. *Zachary Burton*, "Surface Characterization, Adhesion and Friction Properties of Hydrophobic Leaf Surfaces and Nanopatterned Polymers for Superhydrophobic Surfaces," M.S. Thesis, Dept. of Mech. Eng., June 2005.
28. *Anthony D. Alfano*, "Magnetic and Tribological Evaluation of Advanced Metal Evaporated Tapes in an Advanced Tape Drive," M. S. Thesis, Dept. of Mech. Eng., March 2006.
29. *Andrew E. Wright*, "Effect of Operating Parameters on Lateral Tape Motion for Magnetic Tape in an Advanced Linear Tape Drive," M. S. Thesis, Dept of Mech. Eng., May 2006.
30. *Thomas G. Hayes IV*, "Effect of Magnetic Tape Thickness on Durability and Lateral Tape Motion Measurement and Modeling in a Linear Tape Drive," M. S. Thesis, Dept of Mech. Eng., August 2006.
31. *Richard A. Lodge*, "Wetting Behavior and Surface Potential Characteristics of Human Hair," M. S. Thesis, Dept. of Mech. Eng., Nov. 2006.
32. *Derek Petrek*, "New Delay-Integration Method for Measurement of Lateral Tape Motion and Study of Tape Performance Under High Speed Conditions," M.S. Thesis, Dept. of Mech. Eng., Nov. 2007.
33. *Indira P. Seshadri*, "In-Situ Tensile Deformation and Surface Charging Characterization of Human Hair with Atomic Force Microscopy," M.S. Thesis, Dept. of Mech. Eng., April 2008.
34. *James N. Hunt*, "Nanoscale Interface Studies of a Microprojector and Water Fern," M.S. Thesis, Dept. of Mech. and Aero. Eng., May 2011.
35. *Brian D. Dean*, "The Effects of Shark-Skin Inspired Riblet Geometries on Drag in Rectangular Duct Flow," M.S. Thesis, Dept. of Mech. and Aero. Eng., July 2011.
36. *Daniel R. Ebert*, M.S., Dept. of Mech. and Aero. Eng., June 2012.
37. *Jason R. Utter*, "Nanoscale Adhesion, Friction and Wear of Proteins on Polystyrene," M.S. Thesis, Dept. of Mech. and Aero. Eng., Sept. 2012.
38. *Sanjay Ramdon*, "Nanoscale Characterization of Aged Li-ion Battery Cathodes," M.S. Thesis, Dept. of Mech. and Aero. Eng., Aug. 2013.
39. *Samuel G. Martin*, "Fluid Flow Analysis of Continuous and Segmented Riblet Structures," M. S. Thesis, Dept. of Mech. and Aero. Eng., Dec. 2015.
40. *Dev Gurera*, "Lessons from Nature and Bioinspired Fabrication: Mosquito Bite and Lotus Leaf Inspired Superliquiphobic Leather," M. S. Thesis, Dept. of Mech. and Aero. Eng., Nov. 2017.

41. Charles T. Schriener, "Water Droplet Dynamics on Bioinspired Conical Surfaces," M. S. Thesis, Dept. of Mech. and Aero. Eng., April 2019.

M.S. Projects Completed

1. Yun Gao, "Modeling of Tape Slitting Process," M.S. Project, Dept. of Mech. Eng., Aug. 2000.
2. Yuanjie Wu, "AE Energy Models for Selected Solid Contacts," M. S. Project, Dept. of Electrical Eng., Nov. 2001.

B.S. (Hons.) Theses Completed

1. Jack L. Miner, "In Situ Wear Measurement Employing Fonic Sensor and Piezoelectric Transducer," B.S. Honors Thesis, College of Eng., August 1993.
2. Craig T. Gerber, "Experimental Study of Long-Term Static Friction and Magnetic Slider/Disk Interplanar Separation," B.S. Honors Thesis, College of Eng., March 1994.
3. Micah M. Kattner, "Wear Mechanisms of γ -Fe₂O₃ Tape in a Linear Tape Drive," B.S. Honors Thesis, College of Eng., August 1998.
4. Robert A. Sayer, "Surface Construction and Mechanisms of Adhesion in Tokay Gecko Feet and Characterization of a Bio-Inspired Reversible Adhesive Tape," B. S. Honors Thesis, College of Eng., May 2006.
5. Samuel G. Martin, "Fluid Flow Modeling of Biomimetic Structures," B. S. Honors Thesis, College of Eng., April 2013.

High School Thesis Completed

1. Ian McClure, "Shark Skin Inspired Riblets in an Open Channel Environment and Low Viscosity Fluid," Research Paper, Metro Early College High School, Columbus, Ohio, May 2012.

Politecnico di Torino, Torino, Italy

- 2007 Barbara Galasso, "Adhesion, Friction and Wear on Nanoscale of MWNT Probes and CNT Arrays, M.S. Thesis, Department of Mechanics, Politecnico di Torino, Italy (co-advised with Prof. C. Bignardi), Sept. 2007.

Harbin Institute of Technology, Harbin, China

- 2007-09 Yuliang Wang, "Study of Nanobubble and Substrate Interaction and Measurement of Slip Length at Solid Liquid Interfaces," Ph.D. Thesis, Department of Mechatronics (co-advised with Prof. X. Zhao), Dec. 2009.
- 2010-14 Yunlu Pan, "Study of the Relation Between Electric Field and the Drag of Liquid Flow on a Solid Surface in Micro/Nanoscale," Ph.D. Thesis, Department of Mechatronics (co-advised with Prof. X. Zhao), June 2014.
- 2011-14 Dalei Jing, "Study on the Effect of Surface Charge at Solid-Liquid Interface on the Fluid Drag on Micro/Nano Scale," Ph.D. Thesis, Department of Mechatronics (co-advised with Prof. X. Zhao), Dec. 2014.
- 2013-18 Yifan Li, "Study on Boundary Slip at the Solid-Liquid Interface of the Rough Surfaces Immersed in Liquids with Low Surface Tension," Ph.D. Thesis, Department of Mechatronics (co-advised with Prof. X. Zhao), Oct. 2018.
- 2013-18 Shuyang Ding, "Study on the Tactile Perception on Material Properties During Reciprocating Sliding and Tactile Signal Acquisition," Ph.D. Thesis, Department of Mechatronics (co-advised with Prof. X. Zhao), Nov. 2018

China University of Mining and Technology, Xuzhou, China

- 2008-10 Wei Tang, "Nanotribological Properties of Skin," Ph.D. Thesis, Department of Mechanical Eng. (co-advised with Prof. S. Ge), 2010.
- 2011-16 Si Chen, "Mechanism Study on Tactile Perception Evoked by Skin Friction," Ph.D. Thesis, Department of Mechanical Eng. (co-advised with Prof. S. Ge), 2016.

University of Toulouse III – Paul Sabatier, Toulouse, France

- 2010-11 Usama Zaghloul Heiba, "Nanoscale and Macroscale Characterization of the Dielectric Charging Phenomenon and Stiction Mechanisms for Electrostatic MEMS/NEMS Reliability," Doctorat

Conception des Circuits Microélectroniques et Microsystèmes (Design of Microelectronic Circuits and Microsystems) (co-advised with Prof. R. Plana), Sept. 2011.

University of Kragujevac, Kragujevac, Serbia

2011-12 Fatima Zivic, “Nanotribological and Nanomechanical Characterization of Biomaterials,” Ph.D. Thesis, Faculty of Engineering (co-advised with Prof. M. Babic), Feb. 2012.

South China University of Technology, Guangzhou, China

2014-15 Shan Peng, “Preparation of Superhydrophobic/superamphiphobic Surfaces and Investigation of Their Properties,” Ph. D. Thesis, Institute of Materials Science and Engineering, Institute of Materials Science and Engineering (co-advised with Prof. Wenli Deng), October 2015

External Examiner of Doctoral Theses

1. Nicholas X. Randall, “Development and Application of a Multifunctional Nanotribological Tool,” Docteur es Sciences, Institut de Microtechnique, Université de Neuchâtel, Switzerland, Oct. 1997.
2. Serge Ekambi-Pokossi, “Caractérisation et Modélisation Multiéchelle de la Signature Peinture” (Characterization and Multiscale Modeling of Paint Signature), Laboratory of Tribology and Systems Dynamics, Ecole Centrale de Lyon, Ecully, France, July 2005.
3. Enamul Hoque, “Stability and Physical Properties of Alkylsilane and Alkylphosphonate Self-Assembled Monolayer Films on Metal Oxide Substrates Characterized at the Micro- and Nanoscale,” Institut des Matériaux, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland, Jan. 2007.
4. Martin Jenke, “Micro- and Nano-Electrostatic Force Fields: Generation, 3-Dimensional Measurement using a Novel AFM Method and Applications, Institute of Imaging and Applied Optics, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland, June 2008.
5. Alessandro Benedetto, “Grafting Organic Thin Films for the Lubrication of Electrical Contacts,” Department of Chemistry, University of Paris XI, and Chemistry of Surfaces and Interface Laboratory, CEA Saclay, Paris, France, Oct. 2008.
6. Cedric Seguinéau, “Caractérisation Micromécanique de Matériaux en Couche Mince Destinés aux Micro- et nano-Technologies,” Laboratoire SIMaP – Science et Ingénierie des Matériaux et des Procédés, L’Institut Polytechnique de Grenoble, Grenoble, France, Sept. 2009.
7. Dogus Ozkan, “Investigation of Wear Effects of Engine Lubrication Additives on Cylinder Liner-Piston Ring Surfaces,” Department of Mechanical Engineering, Yildiz Technical University, Istanbul, Turkey, May 2016.

External Examiner of Habilitation Thesis

1. Dr. Brunero Cappella, “Bestimmung der Mechanischen Eigenschaften von Polymeren durch AFM-Kraft-Abstands-Kurven,” Chemie Biologie de Universitaet Siegen, Germany, 2008.

Visiting Scientists

9/91-7/93 Dr. Sreekanth Venkatesan, Ph.D. Materials Science and Engineering, Research Associate.
 7/93-8/93 Prof. Katsuhiro Nakashima, Department of Mechanical Engineering, Kyushu Institute of Technology, Kitakyushu, Japan, Visiting Professor.
 4/93-10/93 Prof. Xiaodi Xu, Beijing Graduate School, China University of Mining and Technology, Beijing, China, Visiting Professor.
 8/93-12/93 Dr. Takanori Miyamoto, NTT Interdisciplinary Research Labs., Tokyo, Japan, Visiting Scholar.
 9/92-3/94 Toshio Tsuchiya, Image and Media System Laboratory, Hitachi Ltd., Yokohama, Japan, Visiting Scholar.
 4/92-5/94 Dr. Juai Ruan, Ph.D. Physics, Research Associate.
 6/93-8/94 Dr. Chao Gao, Ph.D. Physics, Visiting Scholar.
 1/94-7/94 Dr. Hsing-Sen S. Hsiao, Ph.D. Mechanical Engineering, Visiting Scholar.
 9/93-9/94 Ulf Jonsson, Exchange Student, Department of Mechanical Engineering, Lulea University of Technology, Lulea, Sweden.
 4/94-8/94 Mathieu Boehm, Exchange Student, Laboratoire De Physicochimie Des Interfaces, Ecole Centrale De Lyon, Lyon, France.
 4/94-8/94 Ludovic Odoni, Exchange Student, Laboratoire De Physicochimie Des Interfaces, Ecole Centrale De Lyon, Lyon, France.
 6/93-12/94 Dr. Xuefeng Tian, Ph.D. Mechanical Engineering, Visiting Scholar.
 9/92-6/95 Dr. B. K. Gupta, Ph.D. Physics, Research Associate.

11/93-7/95	<i>Dr. Brian L. Weick</i> , Ph.D. Materials Engineering Science, Visiting Scholar.
1/94-8/95	<i>Dr. C. Y. Poon</i> , Ph.D. Mechanical Engineering, Research Associate.
1/95-5/96	<i>Dr. Yongsong Xie</i> , Ph.D. Mechanical Engineering, Visiting Scholar.
1/95-5/96	<i>Dr. Youlin Li</i> , Ph.D. Materials Science and Metallurgy, Visiting Scholar.
3/96-8/96	<i>Prof. Dongfeld Diao</i> , Department of Mechanical Engineering, Shizuoka University, Hamamatsu, Japan, Visiting Professor.
11/95-8/96	<i>Dr. Min-Hui (Maria) Yu</i> , Ph.D. Theoretical and Applied Mechanics, Visiting Scholar.
6/97-8/97,	<i>Dr. Brian L. Weick</i> , Assistant Professor, Mechanical Engineering Department, University of the
6/99-8/99	Pacific, Stockton, CA, Visiting Professor.
6 & 9/98, 4 &	<i>Prof. Czeslaw Kajdas</i> , Institute of Chemistry, Warsaw University of Technology, Plock, Poland,
5 & 10/99	Visiting Professor.
9/97-2/98	<i>Roger U. Tuomas</i> , Exchange Student, Department of Mechanical Engineering, Lulea University
	of Technology, Lulea, Sweden.
9/97-2/98	<i>Joakim T. Krantz</i> , Exchange Student, Department of Mechanical Engineering, Lulea University of
	Technology, Lulea, Sweden.
4/96-4/98	<i>Dr. Junguo Xu</i> , Ph.D. Mechatronics & Precision Engineering, Visiting Scholar.
9/97-1/99	<i>Dr. Sumit Chandra</i> , Ph.D. Mechanical Engineering, Visiting Scholar.
12/98-12/99,	<i>Dr. Eui-Sung Yoon</i> , Senior Researcher, Tribology Research Center, Korea Institute of Science &
8/04-10/04,	Technology, Seoul, Korea, Visiting Professor.
10/10-11/10	
4/95-3/00	<i>Dr. Zheming Zhao</i> , Ph.D. Mechanical Engineering, Postdoctoral Researcher.
5/97-4/00	<i>Dr. Xingzhong Zhao</i> , Ph.D. Materials Science and Engineering, Postdoctoral Researcher.
4/99-6/00	<i>Dr. M. S. Bobji</i> , Ph.D. Mechanical Engineering, Visiting Scholar.
8/99-9/00	<i>Prof. Yoshitada Isono</i> , Department of Mechanical Engineering, Ritsumeikan University, Kusatsu,
	Shiga, Japan, Visiting Professor.
4/00-10/00	<i>Dr. Liming Zhang</i> , Ph.D. Materials Science and Engineering, Visiting Scholar.
10/99-11/00	<i>Mr. Takuji Higashioji</i> , M.S. Chemistry, Visiting Industrial Fellow, Toray Industries Inc., Japan.
6/01-6/02	<i>Dr. William W. Scott</i> , Ph.D. Mechanical Engineering, Visiting Scholar.
7/95-7/02	<i>Dr. Xiaodong Li</i> , Ph.D. Materials Science, Research Associate.
7/00-10/02	<i>Dr. Tiejun Ma</i> , Ph.D. Materials Physics, Postdoctoral Researcher.
6/02-2/03	<i>Dr. Jun Qi</i> , Ph.D. Precision Instruments, Visiting Scholar.
11/02-4/03	<i>Prof. Shirong Ge</i> , VP, China University of Mining and Technology, Xuzhou, Jiangsu, China,
	Visiting Professor.
8/03-10/03	<i>Jhon Jairo Olaya Florez</i> , Exchange Student, Metallurgical Engineering, Mexican National
	Autonomous University, Mexico City, Mexico.
11/03	<i>Prof. Paolo Decuzzi</i> , Center for Excellence in Computational Mechanics, Politecnico di Bari,
	Bari, Italy.
10/03-12/03	<i>Dr. Anton V. Goldade</i> , Ph.D. Mechanical Engineering, Visiting Scholar.
11/99-2/04	<i>Dr. Huiwen Liu</i> , Ph.D. Chemical Physics, Visiting Scholar.
2/04-5/04	<i>Michael Reinstaedtler</i> , Exchange Student, Dept. of Experimental Physics, University of Saarland
	and Fraunhofer Institute for Nondestructive Testing, Saarbruechen, Germany.
6/03-9/04	<i>Dr. Toshi Kasai</i> , Ph.D. Materials Science and Engineering, Visiting Scholar.
8/04-10/04	<i>Hyun-Jin Oh</i> , Tribology Research Center, Korea Institute of Science and Technology, Seoul,
	Korea, Visiting Scholar.
9/02-12/04	<i>Dr. Michael Nosonovsky</i> , Ph.D. Mechanical Engineering, Visiting Scholar.
7/04-5/05	<i>Dr. Nianhuan Chen</i> , Ph.D. Chemical Engineering, Visiting Scholar.
1/03-6/05	<i>Dr. Guohua Wei</i> , Ph.D. Metallurgical and Materials Engineering, Visiting Scholar.
3/04-6/05	<i>Dr. Dharma R. Tokachichu</i> , Ph.D. Materials Engineering, Visiting Scholar.
9/05-1/06	<i>Dr. Andrey G. Peressadko</i> , Ph.D. Mechanical Engineering, Visiting Scholar.
9/05-8/06	<i>Dr. Michal Cichomski</i> , Ph.D. Chemistry, Visiting Scholar.
6/04-8/06	<i>Dr. Yaxin Song</i> , Ph. D. Aerospace Eng., Visiting Scholar.
1/03-10/06	<i>Dr. Zhenhua Tao</i> , Ph. D. Mechanical Eng., Visiting Scholar.
12/04-12/06	<i>Dr. Tae-Wan Kim</i> , Ph.D. Mechanical Eng., Visiting Scholar.
2/07-9/07	Barbara Galasso, M.S. Mechanics, Visiting Scholar.
11/07	<i>Dr. Abdelhamid Maali</i> , Nanophysics on Soft Materials With Local Probe Methods, University of
10/10-11/10	Bordeaux, Bordeaux, France, Visiting Scholar.
7/06-8/08	<i>Dr. Kwang Joo Kwak</i> , Ph. D. Biomolecular Engineering, Post-Doctoral Researcher.

9/07-8/08 *Dr. Xing Ling*, Ph.D. Chemistry and Molecular Engineering, Visiting Scholar.

09/07-08/09 *Yuliang Wang*, School of Mechatronic Engineering, Harbin Institute of Technology, Harbin, China, Visiting Student (Ph.D. Joint Training Program funded by China Scholarship Council).

1/08-12/08 *Prof. Kerstin Koch*, Nees-Institute for Biodiversity of Plants, University of Bonn, Germany, Visiting Professor.

10/08-03/10 *Wei Tang*, Department of Mechanical Engineering, China University of Mining and Technology, Xuzhou, China, Visiting Student (Ph.D. Joint Training Program funded by China Scholarship Council).

7/09 *Dr. Sophie Marsaudon*, Nanophysics on Soft Materials With Local Probe Methods, University of Bordeaux, Bordeaux, France, Visiting Scholar.

06/09-08/09 *Prof. Alba Avila*, Department of Electrical Engineering, Andes University, Bogota, Colombia, Visiting Professor.

09/09-11/09 *Juliana Rendon Vera*, School of Materials Engineering, National University of Colombia, Medellin, Colombia, Visiting Scholar.

06/09-01/10 *Eun Kyu Her*, Department of Materials Science and Engineering, Seoul National University, Seoul, South Korea, Visiting Scholar.

02/10-08/10 *Usama Z. Heiba*, Department of Electrical Engineering, Univ. of Toulouse, France and LAAS, CNRS, Toulouse, France, Visiting Scholar.

10/10-12/10 *Dr. Monalisa Mazumder*, Ph.D. Chemical Engineering, Visiting Scholar.

05/10-12/10 *Prof. Zhijun Zhang*, Institute of Mechanical Science and Engineering, Jilin University, Changchun, China, Visiting Professor.

08/10-08/11 *Dr. Hyungoo Lee*, Ph.D. Mechanical Engineering, Visiting Scholar.

7/09-10/11 *Dr. Stephanie Daniels*, Ph.D. Chemistry, Visiting Scholar.

7/11-2/12 *Prof. Jiyu Sun*, Institute of Mechanical Science and Engineering, Jilin University, Changchun, China, Visiting Professor.

3/11-3/12 *Prof. Shunsuke Nishimoto*, Graduate School of Environmental Science, Okayama University, Okayama, Japan, Visiting Professor.

7/11-4/12 *Prof. Shinjun Peng*, Institute of Mechanical Science and Engineering, Jilin University, Changchun, China, Visiting Professor.

10/05-7/12 *Dr. Manual L. B. Palacio*, Ph. D. Materials Science and Eng., Research Associate.

8/10-7/12 Yunlu Pan, School of Mechatronic Engineering, Harbin Institute of Technology, Harbin, China, Visiting Student (Ph.D. Joint Training Program funded by China Scholarship Council).

8/11-8/12 *Prof. Alaattin Ozer*, Department of Mechanical Engineering, Bozok University, Yozgat, Turkey, Visiting Professor.

9/11-9/12 *Prof. Yujuan Wang*, School of Mechanical Engineering, Southeast University, Nanjing, China, Visiting Professor.

10/12-5/13 *Ms. Srimila Perera*, Division of Textile and Clothing Technology, University of Moratuwa, Katubedda, Sri Lanka, World Bank Fellow.

3/11-5/13 *Ms. Si Chen*, Department of Mechanical Engineering, China University of Mining and Technology, Xuzhou, China, Visiting Student (Ph.D. Joint Training Program funded by China Scholarship Council).

1/13-5/13 *Dr. Palanikkumaran Muthiah*, Ph.D. Materials Science and Engineering, Visiting Scholar.

3/11-9/13 *Dalei Jing*, Department of Mechanical Engineering, Harbin Institute of Technology, Harbin, China, Visiting Student (Ph.D. Joint Training Program funded by China Scholarship Council).

10/12-10/13 *Prof. Junping Yao*, "Tribology," Department of Material Process Engineering, Nanchang Hangkong University, Nanchang, China, Visiting Professor.

3/13-3/14 *Prof. (Ms.) Xia Ye*, "Mechanical Design," Department of Mechanical Engineering, Jiangsu Teachers University of Technology, Chang Zhou, China, Visiting Professor.

7/12-3/14 *Dr. Aditya Kumar*, Ph.D. Mechanical Engineering, Postdoctoral Researcher.

5/13-12/14 *Dr. D. Emre Demirocak*, Ph.D. Mechanical Engineering, Postdoctoral Researcher.

9/13-12/14 *Dr. Yongxin Wang*, Ph.D. Fiber and Polymer Science, Postdoctoral Researcher.

2/15-3/15 *Prof. Jinghe Wang*, "Atomic Force Microscopy," Department of Mechanical Engineering, Harbin Institute of Technology, Harbin, China, Visiting Professor.

11/14-5/15 *Dr. Hany Mohamed Magdi*, "Biosynthesis of Nanoparticles," Ph. D. Antibiotics and Antimicrobials, The Regional Center for Mycology and Biotechnology (RCMB), Al-Azhar University, Nasr City, Cairo, Egypt, USAID Fellow.

9/13-9/15	<i>Yifan Li</i> , Department of Mechanical Engineering, Harbin Institute of Technology, Harbin, China, Visiting Student (Ph. D. Joint Training Program funded by China Scholarship Council).
9/14-10/15	<i>Shan Peng</i> , Department of Materials Science and Engineering, South China University of Technology, Guangzhou, China. Visiting Student (Ph. D. Joint Training Program funded by China Scholarship Council).
10/15-11/15	<i>Prof. Zhimin Bai</i> , “Nanoparticles Tribology,” School of Materials Science and Technology, China University of Geosciences, Beijing, China.
1/14-12/15	<i>Dr. Dae-Hyun Cho</i> , Ph.D. Mechanical Engineering, Postdoctoral Researcher.
9/14-12/15	<i>Shou Li</i> , School of Materials Science and Technology, China University of Geosciences, Beijing, China. Visiting Student (Ph. D. Joint Training Program funded by China Scholarship Council).
9/15-1/16	<i>Prof. Baoji Ma</i> , “Tribology,” Industrial Training Center, Xian Technological University, Xian, China.
9/14-8/16	<i>Shuyang Ding</i> , Department of Mechanical Engineering, Harbin Institute of Technology, Harbin, China, Visiting Student (Ph.D. Joint Training Program funded by China Scholarship Council).
1/14-12/16	<i>Dr. Philip S. Brown</i> , Ph. D. Chemistry, Postdoctoral Researcher.
6/16-2/17	<i>Hui Zhang</i> , School of Mechanical Manufacture Engineering and Automation, Southeast University, Nanjing, China, Visiting Student (Ph. D. Joint Training Program funded by China Scholarship Council).
9/16-5/17	<i>Wenjing Ma</i> , College of Chemical Engineering, Nanjing Forestry University, Nanjing, China, Visiting Student (Ph. D. Joint Training Program funded by China Scholarship Council).
10/16-11/17	<i>Hubiao Wang</i> , The College of Biological and Agricultural Engineering, Jilin University, Changchun, China, Visiting Student (Ph. D. Joint Training Program funded by China Scholarship Council).
3/17-12/17	<i>Dr. Joseph C. Cremaldi</i> , Ph.D. Chemical Engineering, Postdoctoral Researcher.
7/18	<i>Prof. Rui F. M. Lobo</i> , “Nanotribology,” Physics Department, New University of Lisbon, Portugal.
3/18-3/19	<i>Dr. Victor Multanen</i> , Ph. D. Chemical Engineering, Postdoctoral Researcher.
9/18-9/19	<i>Prof. Dayong Li</i> , “Nanobubbles and Fluid slip,” School of Mechanical Engineering, Heilongjiang University of Science and Technology Harbin, China.
10/18-9/19	<i>Dr. Dong Song</i> , Ph. D. Mechanical Engineering, Postdoctoral Researcher.
10/18-10/19	<i>Feiran Li</i> , Department of Mechanical Engineering, Harbin Institute of Technology, Harbin, China, Visiting Student (Ph. D. Joint Training Program funded by China Scholarship Council).
9/18-2/20	<i>Wei Feng</i> , Department of Mechanical Engineering, Chongqing University, Chongqing, China, Visiting Student (Ph. D. Joint Training Program funded by China Scholarship Council).

Interns

9/11-5/12	Ian McClure, Metro Early College High School, Columbus, Ohio. Worked on biomimetics/nanotechnology.
6/15-8/15	Clóvis Patrício de Macêdo Filho, University of Rio Grande do Norte, Natal, Brazil. An undergraduate ME student sponsored by the Government of Brazil through the Brazilian Scientific Mobility Program (BSMP). Worked on biomimetics/nanotechnology.
6/15-8/15	Cayque Garcia de Farias, Federal, University Federal of Pampa, Alegrete, Rio Grande do Sul, Brazil. An undergraduate ME student sponsored by the Government of Brazil through the Brazilian Scientific Mobility Program (BSMP). Worked on biomimetics/nanotechnology.

Current Staff Members

Ph.D. Students

2015-	Dev Gurera, “Biomimetics,” Department of Mechanical and Aerospace Engineering.
2019-	Wenting Kong, “Biomimetics,” Department of Mechanical and Aerospace Engineering

INTERNATIONAL ON-SITE REVIEWS and PANELS

The College of Graduate Studies, Kuwait University, Kuwait City, Kuwait, Dec. 2005, Academic Consultant, Evaluated M. S. Program in Eng. Evaluated the courses, faculties, facilities, libraries, and offer suggestions.

European Aeronautic Defence and Space (EADS) Company, Munich, Germany, March 2006, Invited as an international expert to participate in an internal strategy process, which included a mapping of activities in the field of nanotechnology. Presented a review of the trends in the nanotechnologies and an external expert vision for a long-term technology roadmap.

German Research Foundation (Deutsche Forschungsgemeinschaft, DFG), Bonn, Germany, Dec. 2008, Served on the Review Panel, Priority Program on Biomimetic Materials Research Focused on Hierarchical Structuring of Materials.

German Research Foundation (Deutsche Forschungsgemeinschaft, DFG), Potsdam, Germany, April 2011, Served on the Review Panel, Second Priority Program on Biomimetic Materials Research Focused on Hierarchical Structuring of Materials.

German Research Foundation (Deutsche Forschungsgemeinschaft, DFG), Stuttgart, Germany, Sept. 2011, Served on the Review Panel, Priority Program on Molecular Bionics.

German Research Foundation (Deutsche Forschungsgemeinschaft, DFG), Potsdam, Germany, May 2013, Served on the Review Panel, Third Priority Program on Biomimetic Materials Research Focused on Hierarchical Structuring of Materials.

Austrian Science Fund (FWF), Vienna, Austria, June 2013, Served on the Review Panel on Planned Doctoral Program on Bio-Nanotechnology.

German Research Foundation (Deutsche Forschungsgemeinschaft, DFG), Stuttgart, Germany, Oct. 2013, Served on the Review Panel, Priority Program on Molecular Bionics.

German Research Foundation (Deutsche Forschungsgemeinschaft, DFG), Stuttgart, Germany, Oct. 2015, Served on the Review Panel, Priority Program on Molecular Bionics.

German Research Foundation (Deutsche Forschungsgemeinschaft, DFG), Bonn-Bad Godesberg, Germany, Dec. 2017, Served on the Consultant Panel, Research Centre entitled - The Materials Science of Adaptation in Living Matter.

PROFESSIONAL SOCIETY ACTIVITIES

CONFERENCE ORGANIZATION

ASME/STLE Tribology and Mechanics of Magnetic Storage Systems (1984-91).

Organized the first symposium and thereafter until 1991.

ASME Annual International Symposium on Advances in Information Storage and Processing Systems (1990-).

Organized the first symposium and continues to organize the symposium annually, which has provided an excellent forum for researchers in the computer industry.

Sixth International Conference on Magnetic Recording Media, Oxford, UK (July 1995). Member, Program Committee; Session Organizer & Chair, Tribology.

IEEE Asia - Pacific Magnetic Recording Conference, Singapore (Nov./Dec. 1995). Member, Advisory Committee; Session Organizer & Chair, Head - Disk Interface: Tribology & Contamination.

IEEE International Magnetism (Intermag) Conference Program Committee Member (1996-97).

IEEE Asia-Pacific Data Storage Conference, Tao-Yuan, Taiwan (July 1997). Member, Program Committee.

IEEE Asia-Pacific Magnetic Recording Conference, Singapore (July 1998). Technical Program Co-Chair.

IEEE Asia-Pacific Magnetic Recording Conference, Tokyo, Japan (Nov. 2000). Member, Advisory Board.

World Tribology Congress, Vienna, Austria (Sept. 2001). Member, International Scientific and Industrial Committee.

Italian Association of Theoretical and Applied Mechanics (AIMETA) International Tribology Conference: Third- Vietri Sul Mare (Salerno), Italy (Sept. 2002); Fourth- Roma, Italy (Sept. 2004); Fifth- Parma, Italy (Sept. 2005). Member, Scientific Committee.

Heraeus Seminar - Integrating Friction and Wear Research, Ilmenau, Germany, (May 2002). Member, Scientific Program Committee.

BELTRIB 2002 - International Symposium on the Origin of Solid Friction, Gomel, Belarus (Aug. 2002). Member, Organizing Committee.

IEEE Asia-Pacific Magnetic Recording Conference, Singapore (Aug. 2002); Seoul, Korea (Aug. 2004). Member, Steering Committee.

ITC - International Tribology Conference, Zielona Gora, Poland (Second, Aug. 2002; Third, Aug. 2004; Fourth, Aug.-Sept. 2006). Member, Scientific Committee.

SPIE's International Symposium on Micromachining and Microfabrication, San Jose, California (Jan. 2004). Member, Program Committee.

Second International Symposium on Technological Advances of Thin Films & Surface Coatings, Singapore (July 2004). Member, International Advisory Committee.

International School on Nanostructuring and the Indo-German Workshop on Synthesis and Modification of Nano-Structured Materials by Energetic Ion Beams, New Delhi, India (Feb. 2005), Member, International Advisory Board.

Vienna International Conference on Micro- and Nano Technology (Viennano), Wiener Neustadt, Austria (First, March 2005; Second, March 2007; Third, March 2009; Fourth, June 2011; Fifth, Sept. 2013; Sixth, Nov. 2015). Member, Scientific Committee.

SPIE Symposium on Testing, Reliability, and Applications of Micro- and Nano-Materials Systems III, and SPIE Symposium on Advanced Sensor Technologies for Nondestructive Evaluation and Structural Health Monitoring, San Diego, California (March 2005), Member, Program Committee.

Tribochemistry NARA 2005, Nara, Japan (May 2005), Member, International Advisory Board.

International Symposium on Education Through Science, and the Fourth International Workshop on New Trends in Tribology, Bawman Moscow State Technical University, Moscow, Russia (May 2005), Member, International Advisory Council.

SPIE Symposium on Smart Structures and Materials and NDE for Health Monitoring and Diagnostics, San Diego, California (March 2006, 2007, 2008), Member, Program Committee.

Corrosion and Tribology of Advanced Ceramics, 11th International Ceramics Congress (CIMTEC 2006), Acireale, Sicily, Italy (June 2006), Member, International Advisory Board.

Sixteenth European Conference of Fracture (ECF16), Alexandroupolis, Greece (July 2006), Member, Scientific Advisory Board.

Eighth Biennial ASME Conference on Engineering Systems Design and Analysis, Torino, Italy (July 2006), Member Scientific Committee, Track Chair Nanotechnology.

International Conference on Advances in Mechanical Engineering, B.B.S.B Engineering College, Fatehgarh Sahib, Punjab, India (Dec. 2006), Member, International Advisory Committee.

Fifth International Conference on Surface Engineering, Dalian, China (July 2007), Member Advisory Committee.

1st International Congress on Microreliability and Nanoreliability in Key Technology Applications, MicroNanoReliability 2007, Berlin, Germany (Sept. 2007), Member International Program Committee.

European Materials Research Society (E-MRS) Fall Meeting, Warsaw, Poland (Sept. 2007), Member Scientific Committee.

Tribochemistry Kyoto 2009, Kyoto, Japan (Sept. 2009), Member, International Advisory Board.

International Conference of Bionic Engineering (Zhuhai, China, Sept. 2010; Nanjing, China, Aug. 2013), Member of Academic Committee.

International Conference on Biotechnology, Hyderabad, India (March 2011), Member Organizing Committee.

Third European Conference on Tribology (Ecotrib), Vienna, Austria (June 2011), Member of the Scientific Board.

International Tribology Conference, Kaunas, Lithuania, BALTRIB '2011 (Nov. 2011), BALTRIB '2013 (Nov. 2013), Member Scientific Committee.

Fourth International Conference on Smart Materials, Structures, and Systems (CIMTEC), Montecatini Terme, Italy (June 2012), Member International Advisory Board.

International Conference on Bioinspired and Biobased Chemistry & Materials, Nice, France (Oct. 2012), Member Scientific Committee.

Third International Tribology Symposium of IFToMM, Lulea, Sweden (March 2013), Member International Advisory Board.

Thirteenth International Conference on Tribology (SERBIATRIB'13), Kragujevac, Serbia (May 2013), Member of Scientific Committee.

Fourth International Colloids Conference: Surface Design and Engineering, Madrid, Spain (June 2014), Member of Scientific Committee.

Tribology 2015, The South African Institute of Tribology (SAIT), Pretoria, South Africa (March 2015), Member of International Liaison Committee.

International Conference and Expo on Biomechanics and Implant Design, Florida (July 2015), Member of Organizing Committee.

Tribochemistry Nikko 2015, Nikko, Japan (Sept. 2015), Member, International Advisory Board.

International Tribology Conference (ITC2015), Tokyo, Japan (Sept. 2015), Member International Advisory Board.

COST Action MP1303 - Understanding and Controlling Nano and Mesoscale Friction, European Cooperation in Science and Technology, Scientific Advisor (2014-17), International Steering Committee.

First International Conference on Tribology–TURKEYTRIB’15, Istanbul, Turkey (Oct. 2015), Member International Scientific Committee.

International Conference and Exhibition on Hair care & Transplantation, Florida (Dec. 2015), Member Organizing Committee.

Symposium on "Mining Smartness from Nature: From Bio-inspired Materials to Bionic Systems" of CIMTEC 2016, Perugia, Italy (June 2016), Member International Advisory Board.

Second International Conference on Nanoscience and Nanotechnology (ICNSNT), Colombo, Sri Lanka (Sept. 2015), Member Scientific Committee.

International Conference on Materials Chemistry and Environmental Protection, Sanya, China (Nov. 2015), Chair, Technical Program Committee.

International Conference on Biotechnology and Bioengineering (ICBB2015), Singapore (Dec. 2015), Member, Technical Program Committee.

7th World Nano Conference” (Nano 2016), Osaka, Japan (May 2016), Member, Organizing Committee.

SPIE Nanostructured Thin Films VIII, San Diego, CA (Aug. 2015; Aug 2016), Member Program Committee.

Fifth World Congress on Materials Science & Engineering (Materials Congress-2016), Alicante, Spain (June 2016), Member Organizing Committee.

International Conference on Materials Science & Technology (ICMTech - 2016), Delhi, India (March 2016), Member Advisory Committee.

The 2016 EMN Meeting on Nanotubes – Energy Materials Nanotechnology, Hawaii (March 2016), Member International Advisory Committee.

The 2016 EMN Meeting on Bioinspired Materials, Kaohsiung, Taiwan (March 2016), Member International Advisory Committee.

The Fifth International Conference of Bionic Engineering (Ningbo, China, June 2016), Member International Scientific Advisory Committee.

EMN Meeting on DNA and RNA 2016 (Las Vegas, Nevada, October16), Member International Advisory Committee.

International Conference on Polymer Science and Engineering (New Orleans, Aug. 2016), Member Organizing Committee.

EMN Meeting on Nanoparticles 2016 (Singapore, May 2016), Member International Advisory Committee.

International Conference on Applied Crystallography (Houston, Oct. 2016), Member Organizing Committee.

EMN Meeting on Electronic Textiles 2016 (Orlando, FL, Dec. 2016), Member International Advisory Committee.

Thirteenth Biotechnology Congress 2016 (San Francisco, CA, Nov. 2016), Member Organizing Committee.

Second World Congress on Polymer Science & Engineering (Polymer Congress-2017) (Barcelona, Spain, May 2017), Member Organizing Committee.

The 15th International Conference on Tribology, SERBIATRIB’17 (Kragujevac, Serbia, May 2017), Member Scientific Committee.

15th World Medical Nanotechnology Congress & Expo (Medical Nano 17) (Osaka, Japan, Oct. 2017), Member Organizing Committee.

International Conference on Graphene and Semiconductors (Chicago, July 2017), Member Organizing Committee.

International Conference on Nanochemistry (Atlanta, Sept. 2017), Member Organizing Committee.

7th World Congress on Petrochemistry and Chemical Engineering (Atlanta, Nov. 2017), Member Organizing Committee.

International Conference on Diamond and Carbon Materials (Chicago, Illinois, July 2017), Member Organizing Committee.

3rd World Conference on Applied Science, Engineering and Technology (WCASET-17) (Singapore, June, 2017), Member Organizing Committee.

Advanced Materials World Congress (Singapore - Penang, Malaysia, Feb. 2018), Member Organizing Committee.

International Conference on Pharmaceutical and Biomedical Engineering (Pharma Engineering 2017) (Osaka, Japan, Oct. 2018), Member Organizing Committee.

International Conference and Exhibition on Nanoparticles and Nanotechnology (Chicago, Feb. 2018), Member Scientific Committee.

17th International Conference on Emerging Trends in Materials Science and Nanotechnology (Rome, Italy, April 2017), Member Organizing Committee.

4th World Congress on Protein & Biomedical Engineering (Singapore, May 2018), Member Organizing Committee.

2018 International Conference on Biological Information and Biomedical Engineering (BIBE 2018) (Shanghai, China, July 2018), Chair Technical Program Committee.

World Congress on Materials Characterization and Performance (Orlando, March 2018), Member Organizing Committee.

International Conference on Emerging Materials and Nanotechnology (London, UK, March 2018), Member Organizing Committee.

4th International Conference and Exhibition on Glycobiology and Glycochemistry (Singapore, May 2018), Member Organizing Committee.

World Congress on Metallurgy and Functional Materials (Orlando, Florida, March 2018), Member Organizing Committee.

23rd International Conference on Nanomaterials and Nanotechnology - Exploring Advances of Nanomaterial Sciences (London, U.K., March 2018), Member Organizing Committee.

20th International Conference on Emerging Materials and Nanotechnology - Cutting Edge Excavation of Research on Material Science and Nanotechnology (Vancouver, Canada, June 2018), Member Organizing Committee.

6th International Conference on Water Pollution & Sewage Management 2018 - Be a part of Solution, not the Pollution (Rome, Italy, July 2018), Member Organizing Committee.

9th International Conference and Expo on Oil and Gas - Pioneering Revolutionary Technologies in Oil and Gas Field (Madrid, Spain, Aug. 2018), Member Organizing Committee.

International Conference on Green Energy, Green Engineering and Technology (Berlin, Germany, Sept. 2018), Member Organizing Committee.

8th International Conference on Polymer Science and Engineering (Las Vegas, Nevada, Oct. 2018), Member Organizing Committee.

International Conference on Biopolymers & Bio plastics (Biopolymers -2019) (Baltimore, Maryland, March 2019), Member Organizing Committee.

International Conference on Glycobiology and Human Physiology (London, U. K. October 2018), Member Organizing Committee.

World Congress on Mechanical, Metallurgy and Materials Science (Metallurgy-2019), (Milan, Italy, March 2019), Member Organizing Committee.

Nano-Micro Conference 2018 (Jeju Island, South Korea, Sept. 2018), Member Organizing Committee.

WorldWide Conference in Advanced Material Science and Nanotechnology (WWCAMSN -2019) (Dubai, UAE, June 2019), Member Organizing Committee.

3rd International Conference on Gas, Oil and Petroleum Engineering (GOPE-2019) (San Francisco, CA, Feb. 2019), Member Organizing Committee.

3rd World Congress and Expo on Nanotechnology and Materials Science (Dubai, UAE, March 2019), Member Organizing Committee.

The 16th International Conference on Tribology, SERBIATRIB'19 (Kragujevac, Serbia, May 2019), Member Scientific Committee.

First Latin American and Caribbean Tribology Conference, LAC-TC 2019 (Montego Bay, Jamaica, July 2019), Member Scientific Committee.

The 6th International Conference of Bionic Engineering, ICBE2019 (Changchun, China, Sept. 2019), Member Scientific Advisory Committee.

International Summit on Nanomedicine and Nanotechnology (Nanomedicine 2020) (Prague, Czech Republic, April 2020), Member Organizing Committee.

International Summit on Nanomedicine and Nanotechnology (Nanomedicine 2020) (Prague, Czech Republic, April 2020), Member Organizing Committee.

Nature Inspires, Creativity Engineers (NICE-2020) on Biobased and Bioinspired Chemistry & Materials (Nice, France, October 2020), Member International Scientific Committee.

International Conference on Biopolymers and Polymer Chemistry (ISTBPC-2020) (Rome, Italy, Oct. 2020), Member Organizing Committee.

International Conference on Non-Ferrous Metals and Minerals (Vancouver, Canada, Oct. 2020), Member Organizing Committee.

The 10th World Congress on Biopolymers & Bioplastics (Zurich, Switzerland, Aug. 2020), Member Organizing Committee.

The 11th International Conference on Industrial Tribology (ICIT), IndiaTrib-2022 (Delhi, India, Dec. 2022), Member Organizing Committee.

International Summit on Biotechnology & Bioinformatics (ISBB 2023) (San Francisco, CA, Sept. 2023), Member Organizing Committee.

The 6th International Conference on Biomaterials and Nanomaterials (Biomaterials 2022), (London, U.K., March 30-April 1, 2023), Member Organizing Committee.

The 18th International Conference on Tribology, SERBIATRIB'23 (Kragujevac, Serbia, May 2023), Member Scientific Committee.

The 9th Global Congress & Expo on Materials Science and Nanoscience, GCEMSN-2023 (Milan, Italy), Sept. 2023), Member Organizing Committee.

Formation of New ASME Division

Information Storage and Processing Systems Division

Formed a new ASME division in 1992. Founding Chair 1993 - 96 (subdivision), 96-98 (division); Publication Chair 1998-2004.

ASME International

Editor-in-Chief, Advances in Information Storage Systems Series (1991- 1993)

Initiated this series

Associate Editor, Journal of Tribology (1986-90)

Wear Control Committee

Chair (1983-84)

Research Committee on Tribology

Member (1984-97)

Chair - Joint Honors and Awards Committee (1984-88)

Chair - Administration Committee

Chair - Tribology Information Service (1984-86)

Center for Research and Technology Development (1984-86)

Symposium on Tribology and Mechanics of Magnetic Storage Systems, Founding Chair, ASME/STLE Tribology Conference (1984-91)

ASME/STLE Tribology Conference Planning Committee

Member (1985-91)

International Symposium on Advances in Information Storage Systems, Founding Chair, ASME

Winter Annual Meeting (later called International Mechanical Engineering Congress and Expositions, IMECE) (1989-99)

Information Storage and Processing Systems Subdivision

Founding Chair - Executive Committee (1993-1996)

Information Storage and Processing Systems Division

Founding Chair - Executive Committee (1996-98)

Received The Davis Blaine Award for the highest membership growth in a Technical Division in 1997-98.

Member, Executive Committee (1998-2004)

Systems and Design Technical Group Member (1993-2011)

Fellow Peer Correspondent (1995-98)

Member-at-Large, Long-Range Planning (1998-2002)

Member-at-Large, Honors & Award (2002-2003)

Vice Chair (2002-2004)

Member-at-Large (2005-2011)

National Nominating Committee, Alternate member (1996-2002), Member (2002-2003), Secretary/Chair (2003-2004)

Committee on Technology Executives Conference (CTEC), Member (2001-2005)

Mechatronics and Intelligent Machines, Track Co-Organizer, ASME International Mechanical Engineering Conference, Denver, Colorado (2011)

Green and Biomimetics Tribology Track, Co-Chair, ASME/STLE Tribology Conference (2011-14)

ASME Tribology Division Leadership Team, Member and Chair of Technical Expositions (2015-16), Vice Chair (2016-17), Chair (2017-19)

Led an effort to develop an agreement between ASME and STLE society in order to reinstate an annual joint ASME-STLE Tribology Frontiers Conference (TFT).

ASME Technology Advisory Panel (TAP) (2016-17), Member, Sixteen “experts” across ASME to make decision concerning what emerging technologies ASME should invest its time.

ASME Engineering Sciences Segment (ESS) Board Leadership Team (2016-19), Member, Responsible for Strategic Plan and Nanotechnology Activities across ASME.

ASME Robert H. Thurston Lecture Award Selection Committee, Member (2017-23).

ASME Nominating Committee (NC), Member (2018-20)

ASME Tribology Division, Honors and Awards Committee, Member (2021-26).

Society of Tribologists and Lubrication Engineers (STLE)

Lubrication Fundamentals Committee

Vice-Chair (1982-84)

Chair (1984-87)

Awards Committee

Member (1984-88)

International Tribology Council (ITC)

Vice President, representing ASME Tribology Division (2017-2026)

International Society of Bionic Engineering ISBE)

Founding Member, Member, Board of Directors, and USA representative (2010-)

NATURE

Nature's Reader Panel

Member (2008-10)

Computer History Museum, Mountain View, CA

Storage Special Interest Group (Storage SIG), Member (2022-)

EDITOR OF MAJOR JOURNALS

Editor-in-Chief - *Microsystem Technologies* (with B. Michel), Springer-Verlag, Vol. 8, 2002-; formerly, *Journal of Information Storage and Processing Systems*, Birkhauser Boston (A Division of Springer-Verlag), Vol. 1-3, 1999-2001.

Member of Editorial Board, Proceedings of the National Academy of Sciences (PNAS) (2014-16)

Editor-in-Chief, Nanomaterials Section of SpringerMaterials (2015-16).

Editorial Advisory Board – *Beilstein Journal of Nanotechnology* (2010-).

Editorial Advisory Board – *Journal of Colloid and Interface Science* (2011-).

OTHERS

Editor-in-Chief, Mechanics and Materials Science Series, CRC Press (1993-2002)

Initiated this series.

Editor-in-Chief, Advances in Information Storage Systems Series, ASME Press (1991-93), World Scientific (1994-99)

Initiated this series.

Editor-in-Chief, Journal of Information Storage and Processing Systems, Birkhauser (Springer-Verlag) (1998-2001)

Initiated this journal.

Member, Editorial Advisory Board, Tribology Letters (1995-2005)

Member, Editor Advisors Board, Data Storage (1996-2002)

Honorary Member, The Research Board of Advisors, The American Biographical Institute, Raleigh, North Carolina (1996-)

Member, Editorial Board, Journal of Friction and Wear, Belarus (1998-)

Co-Editor, NanoScience and Technology Series, Springer-Verlag (2004-)

Member, Editorial Board, International Journal of Surface Science and Engineering (2006-)

Member, Editorial Board, International Journal of Materials and Structural Integrity (2006-)

Member, Editorial Board, International Journal of Nanosystems (2006-)

Member, Editorial Board, Advances in Tribology (2007-)

Member, Editorial Board, Research Letters in Nanotechnology (2008-)

Member, Editorial Board, Journal of Nanotechnology (2008-)

Member, Editorial Board, The Open Mechanical Engineering Journal (2007-)

Member, Editorial Board, The Open Ceramic Science Journal (2008-)

Member, Editorial Board, The Open Polymer Science Journal (2008-)

Member, Editorial Board, The Open Surface Science Journal (2008-)

Member, Editorial Board, The Open Condensed Matter Physics Journal (2008-)

Member, Editorial Board, The Open Colloid Science Journal (2008-)

Member, Editorial Board, The Journal of Biotechnology Applications (2010-)

Member, Editorial Board, Tribology in Industry (2011-)

Member, Editorial Board, Open Journal of Organic Polymer Materials (2011-)

Member, Editorial Board, The Open Nanoscience Journal (2011-)

Member, Editorial Board, Lubricants (2011-)

Member, Editorial Board, Surface Innovations (2012-)
 Member, Editorial Board, International Journal of Nano and Biomaterials (2012-)
 Member, Editorial Board, Friction and Wear Research (2013-)
 Member, Editorial Board, JSM Nanotechnology & Nanomedicine (2013-)
 Member, Editorial Board, Nanobiomedicine Journal (2014-)
 Member, Editorial Board, NanoSciTech Open Library at Science Fair Open Library (2014-)
 Member, Editorial Board, International Journal of Nanomaterials, Nanotechnology and Nanomedicine (2015-)
 Member, Editorial Board, International Journal of Respiratory and Pulmonary Medicine (2015-)
 Member, Editorial Board, Journal of Civil Engineering and Environmental Sciences (2015-)
 Member, Editorial Board, Journal of Bio-Inspired Nanotechnology (2015-)
 Member, Editorial Board, Inventions (2015-)
 Member, Editorial Board, Journal of Regenerative Therapeutics (2015-)
 Member, Editorial Board, Journal of Mineral, Metal and Material Engineering (2015-)
 Member, Editorial Board, Bioanalytical Techniques (2015-)
 Member, Editorial Board, International Journal of Innovative Studies in Sciences and Engineering Technology (2015-)
 Member, Editorial Board, Biomimetics (2015-)
 Member, Editorial Board, Open Access Journal of Science and Technology (2016-)
 Member, Editorial Board, Polymer Materials Science & Engineering (2016-)
 Member, Editorial Board, Molecular Medicine Open Access (2016-)
 Member, Editorial Board, Biology, Engineering and Medicine (BEM) (2016-)
 Member, Editorial Board, Journal of Nanoscience and Nanotechnology (2017-)

JOURNAL AND MAJOR INTERNATIONAL PROPOSAL REVIEWER

Nature, Nature Materials, Nature Nanotechnology
 Science
 PNAS
 Physical Review
 Physical Review Letters
 Journal of Applied Physics
 Applied Physics Letters
 Journal of Physics
 Ultramicroscopy
 Journal of Microscopy
 Langmuir
 Surface Science
 Journal of Vacuum Science and Technology
 Thin Solid Films
 Acta Materialia
 Scripta Materialia
 Journal of Materials Research
 Zeitschrift fuer Metallkunde
 Nanotechnology
 Sensors and Actuators
 IEEE/ASME Journal of Microelectromechanical Systems
 Journal of Micromechanics and Microengineering
 Microsystem Technologies
 Journal of Information Storage and Processing Systems
 IEEE Transactions on Magnetics
 ASME Journal of Applied Mechanics
 ASME Journal of Tribology
 ASME Journal of Engineering Materials and Technology
 ASME Journal of Engineering for Industry
 ASME Advances in Information Storage Systems
 Applied Mechanics Reviews
 International Journal of Solids and Structures
 STLE Lubrication Engineering, Tribology Transactions
 Tribology International

Wear
Tribology Letters
Experimental Mechanics
WORLDTRIB World Tribology Congress
International Conference on Metallurgical Coatings and Thin Films
International Union of Theoretical and Applied Mechanics

PROPOSAL REVIEWER

National Science Foundation and its Panels
National Institute of Health
Department of Energy and its Panels
Air Office Office of Scientific Research
Office of Naval Research and its Panels
Naval Sea Systems Command
European Science Foundation
TFR, Sweden
The Israel Science Foundation, Jerusalem
US - Israel Binational Science Foundation (BSF), Jerusalem
University Grants Committee, Hong Kong
Science & Eng. Research Council, Singapore
Ministry of Science and Technology, New Delhi, India
German Science Foundation
Austrian Science Fund

SERVICE TO THE STATE OF OHIO AND THE OHIO STATE UNIVERSITY

1991-04 **Ohio Science and Engineering Roundtable**, Member of Executive Committee and Chair of Computing.
1993 -99 **The Ohio Academy of Science, The Senior Academy Council.**
1991- **President's and Provost's Advisory Committee.**
1991- **Tribology Research Group.** Established a major tribology research laboratory. Had major responsibility for its continued growth; creation of a graduate curriculum; initiation of research funds. Initiated ties with government agencies, industrial groups and professional societies with related interests. Chaired the search committee for an additional faculty member.
1991 **M.E. Department Adhoc Committee**, Chair
 Recommended revised course requirements and theses credits for M.S. and Ph.D. degrees.
1991-94 **Faculty Advisory Committee for the Center for Materials Research.**
1992-94 **M.E. Department Graduate Studies Committee**, Chair, Ph.D. admissions.
1993-96 **Distinguished Scholar Awards Selection Committee.**
1994-95 **M.E. Tribology Faculty Search Committee**, Chair.
1994-96 **Research and Graduate Council - Engineering Sciences**, Member, and **University Research Committee.**
1995-98 **Faculty Committee on Patents and Copyrights.**
1996-97 **M.E. Department Task Force on Faculty Rewards Structure**, Chair.
1996-98 **Mechanical Engineering Department Executive Committee.**
1997-98 **Design Focus Group, M.E. Department**, Chair.
2000 **M.E. Department Strategic Planning Committee.**
2000-02 **M.E. Department Graduate Studies Committee.**
2000-01 **The D. D. Glower Chair in Engineering Search Committee.**
2000-01 **Ohio Eminent Scholars in Nanotechnology, Proposal Action Committee.**
2000-02 **University Distinguished Lecture Series, Selection Committee.**
2001-03 **M.E. Design and Manufacturing Search Committee.**
2003-06 **M.E. Promotion and Tenure Committee.**
2003-04 **M.E. Michael Chen Lecture Series.**
2004-05 **Ohio Eminent Scholar in Nanotechnology Search Committee.**
2004-06 **M.E. Mechanical Systems Search Committee.**
2005 **M.E. Design and Manufacturing Search Committee.**

- 2006 **The R. W. Kurtz Chair Search Committee, Chair.**
- 2006-07 **125th Anniversary of the Department of Mech. Eng. Seminar Series.**
- 2007-10 **Faculty Professional Leave Committee for College of Engineering.**
- 2008-13 **M.E. Promotion and Tenure Committee, Chair 2009.**
- 2008-10 **University Distinguished Lecture Series, Selection Committee.**
- 2008 **Endowed Chair and Professorship Holder Evaluation Committee for College of Engineering.**
- 2008-09 **M.E. Design and Manufacturing Search Committee.**
- 2010-20 **India Gateway Faculty Advisory Committee, Vice-Provost for Global Strategies and International Affairs.**
- 2011-12 **College of Engineering Adhoc Committee on Addressing the Problem with Escalating Start-up Packages.**
- 2014-18 **ME Honors and Awards Committee.**
- 2016-18 **Convener, Distinguished University Professor Selections Committee.**
- 2016-19 **College of Engineering Faculty Awards Committee.**
- 2016-18 **College of Engineering Investigations Committee to review Research Misconduct Complaint.**

SERVICE TO GOVERNMENT LEGISLATURE

- 1993-94 **Ohio State Univ. Research Team, Made presentations to educate Ohio state legislators on the value of higher education.**
- 2002-04 **Hon. Patrick J. Tiberi, Congressman, 12th District, Ohio, on National Nanotechnology Research and Development Program Bill.**
- 2013-14 **ASME Science and Technology Policy Fellow, House Committee on Science, Space, and Technology and House Committee on Oversight and Government Reform, U.S. Congress, Washington, DC.**

BIOGRAPHICAL LISTINGS

1. Who's Who in the World, 7th Ed. (1984) to 13th Ed. (1996).
2. Who's Who in America, 49th Ed. (1995) to 72nd Ed. (2019).
3. Who's Who in Science and Engineering, 2nd Ed. (1994), 11th Ed. (2011-12); 12th Ed. (2016-17).
4. Who's Who in Engineering, 4th Ed. (1980), 8th Ed. (1991), 12 Ed. (2016-17).
5. American Men and Women of Science, 14th Ed. (1979) to 34th Ed. (2016).
6. Who's Who in Technology Today, 1st Ed. (1979), 2nd Ed. (1980).
7. Who's Who in Frontiers of Science and Technology, 1st Ed. (1984), 2nd Ed. (1985).
8. Who's Who in Finance and Business, 35th Ed. (2006-07) to 37th Ed. (2009-10).
9. Who's Who in the East, 17th Ed. (1979-80) to 19th Ed. (1982-83).
10. Who's Who in the West, 19th Ed. (1984-85) to 29th Ed. (2003).
11. Who's Who in the Midwest, 24th Ed. (1994-95) to 33rd Ed. (2007).
12. Men of Achievement (U.K.), 7th Ed. (1979-80) to 17th ed. (1996).
13. Dictionary of International Biography (U.K.), 17th Ed. (1980-81) to 29th Ed. (2001).
14. International Man of the Year, 1996/97, 1999/2000, 2000/2001; IBC's Top 100 Scientists, 2016; Great Men and Women of Science, 2017, International Biographical Center, Cambridge, U. K.
15. International Leaders in Achievement, 4th Ed. (1997).
16. Notable Americans, 3rd Ed. (1978-79).
17. Personalities of America, 3rd Ed. (1985), 4th Ed. (1986).
18. The Directory of Distinguished Americans (U.K.), 2nd Ed. (1982-83) to 5th Ed. (1994).
19. Community Leaders of America, 11th Ed. (1979-80).
20. International Who's Who in Community Service (U.K.), 4th Ed. (1980).
21. Community Leaders of the World, 1st Ed. (1983).
22. International Directory of Distinguished Leadership, 6th Ed. (1997).
23. The International Who's Who of Contemporary Achievement (1984-85).
24. Directory of World Academic/Industrial Researchers 1980's.
Research Subjects - 20,000 Items (Japan), 1st Ed. (1981).
25. Who's Who Among Indians in the Western United States, 1st Ed. (1982).
26. Who's Who Registry of Global Business Leaders (1992).
27. 2000 Outstanding Intellectuals of the 20th Century (IBC, Cambridge, U.K.), 2000.

28. 2000 Outstanding Scholars of the 20th Century (IBC, Cambridge, U.K.), 2000.
29. Lexington Who's Who Registry (1999/2000).
30. Who's Who in the 21st Century (IBC, Cambridge, U.K.), 2001.
31. Who's Who in Engineering Education (World Wide Web), 2002.
32. United Who's Who, Florida, 2002.
33. 2000 Outstanding Scientists of the 21st Century (IBC, Cambridge, U.K.), 2004.
34. 21st Century Award for Achievement (IBC, Cambridge, U.K.), 2004.
35. Strathmore's, Who's Who, 2003-04.
36. 2000 Outstanding Intellectuals of the 21st Century (IBC, Cambridge, U.K.), 2004.
37. International Scientist of the Year (IBC, Cambridge, U.K.), 2004.
38. Cambridge Blue Book (IBC, Cambridge, U.K.), 2005.
39. National Register's Who's Who (Babylon, NY), 2005.

KEYNOTE AND PLENARY LECTURES

(On six continents)

1. Introductory Speaker - ASME/ASLE Tribology and Mechanics of Magnetic Storage Systems Conference, San Diego, October 1984.
2. Introductory Speaker - ASME/ASLE Tribology and Magnetic Storage Systems Conference, Atlanta, October 1985.
3. Plenary Lecture - "Surface Coatings for Tribological Application," International Tribology Workshop, Indian Institute of Technology, New Delhi, India, March 1986.
4. Introductory Speaker - ASME/ASLE Tribology and Mechanics of Magnetic Storage Systems Conference, Pittsburgh, October 1986.
5. Introductory Speaker ASME/ASLE Tribology and Mechanics of Magnetic Storage Systems Conference, San Antonio, Texas, October 1987.
6. Plenary Lecture - "Tribological Design-Information Storage and Retrieval," Fifteenth Leeds/Lyon Symposium on Tribology, University of Leeds, Leeds, U.K., September 1988.
7. Keynote Speaker - "Friction and Wear Issues in Magnetic Recording," American Chemical Society National Meeting, Los Angeles, September 1988.
8. Introductory Speaker - ASME/STLE Tribology and Mechanics of Magnetic Storage Systems Conference, Baltimore, October 1988.
9. Plenary Lecture - "Magnetic Media Tribology - State-of-the-Art and Future Challenges," Eurotrib, 5th International Congress on Tribology, Helsinki, Finland, June 1989.
10. Introductory Speaker - ASME/STLE Tribology and Mechanics of Magnetic Storage Systems Conference, Fort Lauderdale, Florida, October 1989.
11. Introductory Speaker - ASME/STLE Tribology and Mechanics of Magnetic Storage Systems, Toronto, Canada, October 1990.
12. Keynote Speaker - "Microtribology of Magnetic Storage Devices," Eighth International Conference on Wear of Materials, Orlando, Florida, April 1991.
13. Opening Address - "Magnetic Media Tribology: State-of-the-Art and Future Challenges," National Space Science Data Center Conference on Mass Storage Systems and Technologies for Space and Earth Science Applications, NASA Goddard Space Flight Center, Greenbelt, Maryland, July 1991.
14. Invited NATO Lecture - "Historical Evolution of Magnetic Storage Devices," NATO - Advanced Study Institute Course on High Density Digital Recording, Il Cioccio, Italy, June 1992.
15. Invited NATO Lecture - "Recording Head-Medium Interface," NATO - Advanced Study Institute Course on High Density Digital Recording, Il Cioccio, Italy, June 1992.
16. Plenary Lecture - "Tribology of Thin Films and Bulk Ceramics and Their Applications to Magnetic Storage Devices," Vth International Symposium: INTERTRIBO'93, Bratislava, SR, August 1993.
17. Plenary Lecture - "Microtribology and its Applications to Magnetic Storage Devices," Eurotrib, 6th International Congress on Tribology, Budapest, Hungary, August - September 1993.
18. Keynote Speaker- "Microtribology and its Applications to Magnetic Storage Devices," The First International Colloquium: Micro-tribology '93, Laliki, Poland, September, 1993.
19. Invited NATO Lecture - "History of Tribology and Nanotribology," NATO - Advanced Study Institute Course on Forces in Scanning Probe Methods, Schluchsee, Germany, March 1994.
20. Invited NATO Lecture - "Nanotribology and its Applications to Magnetic Storage Devices and MEMS," NATO - Advanced Study Institute Course on Forces in Scanning Probe Methods, Schluchsee, Germany, March 1994.

21. Plenary Lecture - "Tribology of Solid Contacts in Magnetic Recording Devices," Twelfth U.S. National Congress of Applied Mechanics, Seattle, Washington, June 1994.
22. Lead Lecture - "Micro/Nanotribology and Its Applications," NSF Workshop on the Mechanics and Materials Science of Contact: Issues and Opportunities, Vanderbilt University, Nashville, Tennessee, July 1994.
23. Plenary Lecture - "Nanotribology and Its Applications to Magnetic Storage Devices and MEMS," Fourth International Tribology Conference, AUSTRIB '94, Perth, Australia, December 1994.
24. Plenary Lecture - "Macro - and Microtribology of Magnetic Rigid-Disk Storage Devices," Sixth International Conference on Magnetic Recording Media, MRM'95, Oxford, U.K., July 1995.
25. Plenary Lecture - "Tribology and its Impact on Ohio Industry," Open House for Teaching/Research for Ohio Congress, The Ohio State University, Columbus, Ohio, September, 1995.
26. Keynote Luncheon Speaker - "Alternative Substrate Materials - Selection, Roughness Measurement and Contact Analysis for Roughness Optimization," IDEMA Alternate Substrates Symposium, San Jose, California, Sept. 1995.
27. Lead Lecture - "Micro/Nanotribology and its Applications," 1995 Korea - USA Tribology Symposium, Seoul National University, Seoul, Korea, October 1995.
28. Lead Lecture - "Micro/Nanotribology of Magnetic Storage Devices," International Tribology Conference, Yokohama, Japan, Oct./Nov. 1995.
29. Plenary Lecture - "Information Storage Systems: Mechanical Engineering Challenges for the Next Decade," Emerging Technologies Symposium, ASME International Mechanical Engineering Congress & Exposition, San Francisco, California, Nov. 1995.
30. Keynote Luncheon Speaker - "Alternative Substrate Materials - Selection, Roughness Measurement and Contact Analysis for Roughness Optimization," IDEMA Penang Technical Conference: Disk Drives and Components, Penang, Malaysia, Dec. 1995.
31. Keynote Lecture - "Nanotribology and Nanomechanics of MEMS Devices," IEEE Ninth Annual International Workshop on Micro Electro Mechanical Systems, San Diego California, Feb. 1996.
32. Lead NATO Lecture - "History of Tribology and Micro/Nanotribology," NATO - Advanced Study Institute Course on Micro/Nanotribology and its Applications, Sesimbra, Portugal, June 1996.
33. Invited NATO Lecture - "Friction, Scratching/Wear, Indentation and Lubrication on Micro- to Nanoscales," NATO - Advanced Study Institute Course on Micro/Nanotribology and its Applications, Sesimbra, Portugal, June 1996.
34. Invited NATO Lecture - "Nanolubrication of MEMS and Magnetic Storage Devices," NATO - Advanced Study Institute Course on Micro/Nanotribology and its Applications, Sesimbra, Portugal, June 1996.
35. Invited H. D. Thesis Lecture - "Macro/Microtribology of Magnetic Storage Devices," Warsaw University of Technology, Warsaw, Poland, November 1996.
36. Keynote Address - "Micro/Nanotribology and its Applications: State of the Art," International Conference on Micromechatronics for Information and Precision Equipment (MIPE) 1997, Tokyo, Japan, July 1997.
37. Plenary Lecture - "Micro/Nanotribology Using Atomic Force/Friction Force Microscopy: State-of-the-Art," First World Tribology Congress, London, U.K., Sept. 1997.
38. Plenary Lecture - "Contact Recording Technology: State-of-the-Art and Future Tribology Challenges," Tribology of Information Storage Devices, Institute of Physics, London, U.K., Dec. 1997.
39. Plenary Lecture - "Macro- and Micro/Nanoscale Studies of Molecularly-Thick Boundary Layers of perfluoropolyether Lubricants," 11th International Colloquium on Tribology: Industrial and Automotive Lubrication, Technische Akademie Esslingen, Ostfildern, Germany, Jan. 1998.
40. Dinner Lecture - "Tribology: Macro- to Microscale," IEEE Central New England Chapter, Worcester, Massachusetts, March 1998.
41. Dinner Lecture - "Tribology: Macro- to Microscale," STLE Detroit Chapter, Livonia, Detroit, Michigan, April 1998.
42. Lead Lecturer - "Nanotribology," Workshop on Nanoscience, sponsored by the Swiss National Science Foundation, Hasliberg, Switzerland, October 1998.
43. Guest Lecturer - "Micro/Nanotribology and its Applications to MEMS," From Nano to Macroscale Science and Technology through Microsystems, Second France - Japan Workshop, Toulouse, France, Nov. 1998.
44. Interfoundation Grant Lecturer, "Micro/Nanotribology," Ecole Centrale de Lyon, France, Sponsored by Franco-American Commission for Educational Exchange, Paris, April 1999.
45. Seminaire de Ecole Doctorale - "Micro/Nanotribology and its Applications," Ecole Centrale de Lyon/Institut National des Sciences Appliquees/Universite Claude Bernard - Lyon I, Lyon France, On an Interfoundation Grant from Franco-American Commission for Educational Exchange, Paris, France, April 1999.

46. Keynote Speaker – “Micro/Nanotribology and its Applications to MEMS,” Annual Conference of the Oesterreichischen Gesellschaft fuer Mikrosystemtechnik, Wien, Austria, April 1999.
47. Keynote Speaker – “Nanoscale Tribophysics and Tribomechanics,” 12th International Conference on Wear of Materials, Atlanta, Georgia, April 1999.
48. Keynote Speaker – “Macro- and Microtribology of Magnetic Storage Devices,” 26th Leeds-Lyon Symposium on Tribology, Univ. of Leeds, Leeds, U.K., Sept. 1999.
49. Institute Wide Lecture – “Micro/Nanotribology,” Indian Institute of Science, Bangalore, India, Dec. 1999.
50. Invited NATO Lecture – “Macro- and Microtribology of Magnetic Rigid Disk Drives,” NATO - Advanced Study Institute Course on Magnetic Storage Systems Beyond 2000, Rhodes, Greece, June 2000.
51. Lead NATO Lecture – “History of Macro- and Micro/Nanotribology and its Applications,” NATO-Advanced Study Institute Course on Fundamentals of Tribology and Bridging the Gap Between the Macro- and Micro/Nanoscales, Keszthely, Hungary, Aug. 2000.
52. Invited NATO Lecture – “Friction, Wear, Lubrication and Materials Characterization Studies Using SPM,” NATO-Advanced Study Institute Course on Fundamentals of Tribology and Bridging the Gap Between the Macro- and Micro/Nanoscales, Keszthely, Hungary, Aug. 2000.
53. Invited NATO Lecture – “Macro- and Microtribology of Magnetic Storage Devices and MEMS,” NATO-Advanced Study Institute Course on Fundamentals of Tribology and Bridging the Gap Between the Macro- and Micro/Nanoscales, Keszthely, Hungary, Aug. 2000.
54. Plenary Lecture – “Nano-to-Microscale Wear and Mechanical Characterization Using Scanning Probe Microscopy,” 13th International Conference on Wear of Materials, Vancouver, Canada, April 2001.
55. Plenary Lecture – “Micro/Nanotribology and Materials Characterization Studies Using Scanning Probe Microscopy,” Sikkim International Nanotribology Symposium, Pelling, Sikkim, India, May 2001.
56. Plenary Lecture – “Macro- and Microtribology of Magnetic Storage Devices and MEMS,” Sikkim International Nanotribology Symposium, Pelling, Sikkim, India, May 2001.
57. Plenary Lecture – “Investigation of Nanotribological Properties of Alkylthiol and Biphenyl Thiol Self-Assembled Monolayers,” Tokyo-2001 - Scanning Probe Microscopy, Sensors and Nanostructures, Tokyo, Japan, May 2001.
58. Plenary Lecture - “Friction, Wear, Lubrication, and Materials Characterization Studies Using Scanning Probe Microscopy,” Second World Tribology Congress, Vienna, Austria, Sept. 2001.
59. Keynote Speaker - “Micro/Nanoscale Tribology of MEMS Materials, Lubricants and Devices,” Second AIMETA, (Italian) International Tribology Conference, Vienna, Austria, Sept. 2001.
60. Invited Lead Lecture - “Nanoscale Boundary Lubrication Studies,” 28th Leeds-Lyon Symposium on Tribology, Vienna, Austria, Sept. 2001.
61. Institute Colloquium Lecture- “Micro/Nanotribology and Materials Characterization Studies Using Scanning Probe Microscopy,” Max Planck Institute for Metals Research, Duesseldorf, Germany, Feb. 2002.
62. TexTalk (TI Colloquium) - “Micro/Nanoscale Tribology and Mechanics of MEMS/NEMS Materials, Lubricants, and Devices,” Digital Light Processing Products, Texas Instruments Inc., Plano, Texas, April 2002.
63. Invited Lead Lecture - “Nanotribological Characterization of Molecularly-Thick Lubricant Films for Applications to MEMS/NEMS by Atomic Force Microscopy,” Las Vegas-2002 - Scanning Probe Microscopy, Sensors and Nanostructures, Las Vegas, Nevada, May 2002.
64. Colloquium - “Micro/Nanotribology and Materials Characterization Studies of Ultrathin Films,” Corporate R&D, Materials Research, Dow Chemical Co., Midland, Michigan, Dec. 2002.
65. Institute Colloquium Lecture- “Micro/Nanoscale Tribology and Mechanics of MEMS/NEMS Materials and Devices,” Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California, Jan. 2003.
66. Invited Lecture - “Micro/Nanoscale Tribology and Mechanics of MEMS/NEMS Materials and Devices,” Technical Interchange Meeting on Transformational Systems Concepts & Technologies for Future Space Missions, California Institute of Technology, Pasadena, California, Jan. 2003.
67. Invited Lead Lecture - “Micro/Nanoscale Tribology and Mechanics of MEMS/NEMS Materials and Devices,” Reliability, Testing, and Characterization of MEMS/MOEMS, SPIE Photonics West Technical Conference, San Jose, CA, Jan. 2003.
68. Lab Colloquium - “Micro/Nanotribology and Materials Characterization Studies Using Scanning Probe Microscopy,” Corporate Research and Development, Proctor & Gamble Company, Cincinnati, Ohio, March 2003.
69. Invited Lecture - “Nanotribological Characterization of Digital Micromirror Devices Using Atomic Force Microscopy,” Oxford-2003 - Scanning Probe Microscopy, Sensors and Nanostructures, Heythrop Park, U.K., May 2003.

70. Invited Lecture - "Micro/Nanoscale Tribology and Mechanics of MEMS/NEMS Materials and Devices," Institut de Physique de la Matiere Complexe, Ecole Polytechnique Federale de Lausanne (EPFL), Lausanne, Switzerland, July 2003.
71. Plenary Lecture (Video) - "Micro/Nanotribology and Materials Characterization Studies Using Scanning Probe Microscopy," The 4th European Symposium on Nano-Mechanical Testing (Nanomech 4), Hueckelhoven, Germany, Sept. 2003.
72. Invited Lead Lecture - "Micro/Nanoscale Tribological and Mechanical Characterization for MEMS/NEMS," Reliability, Testing, and Characterization of MEMS/MOEMS III, SPIE Photonics West Technical Conference, San Jose, CA, Jan. 2004.
73. Invited Lead Lecture - "Micro/Nanoscale Tribological and Mechanical Characterization for MEMS/NEMS," Testing, Reliability, and Application of Micro- and Nanomaterial Systems, SPIE's International Symposium on NDE for Health Monitoring and Diagnostics, San Diego, CA, March 2004.
74. Institute Colloquium Lecture - "Micro/Nanoscale Tribology and Mechanics of MEMS/NEMS Materials and Devices," Instituto de Investigaciones en Materiales, Universidad Nacional Autonoma de Mexico, Mexico, D.F., March 2004.
75. Special Symposium on "Tribology of MEMS" by Prof. B. Bhushan funded by National Natural Science Foundation of China, China University of Mining and Technology, Xuzhou, China, May 2004.
76. Invited Lead Lecture - "Modifications of Atomic Force Microscope for Nanotribological Studies at High Velocities," Beijing-TEDA 2004 - Scanning Probe Microscopy, Sensors, and Nanostructures, Beijing, China, May 2004.
77. Invited Lead Lecture - "Nanotribological Studies of Molecularly Thick Films Using Atomic Force Microscopy," 16th International Vacuum Congress, 12th International Conference on Solid Surfaces, and 8th International Conference on Nanometer-Scale Science and Technology, Venice, Italy, June 2004.
78. Institute Colloquium Lecture - "Micro/Nanoscale Tribology and Mechanics of MEMS Materials and Devices," Fraunhofer Institute for Reliability and Microintegration (IZM), Berlin, Germany, July 2004.
79. ASME Robert Henry Thurston Lecture - "Nanotribology and Nanomechanics: State-of-the-Art and Critical Importance to Nanotechnology," ASME International Mechanical Engineering Congress & Exposition, Anaheim, California, Nov. 2004.
80. The First Annual J. W. Chen Lecture of the MEEP Department, "Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/NEMS Materials and Devices," Southern Illinois University, Carbondale, Illinois, Nov. 2004.
81. Lab Colloquium - "Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices," MEMS Device Technologies, Sandia National Laboratories, Albuquerque, New Mexico, Feb. 2005.
82. Plenary Lecture - "Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices," First Vienna International Conference on Micro- and Nanotechnology, Vienna, Austria, March 2005.
83. Invited Lead Lecture - "Hydrophobicity, Adhesion and Friction Properties of Polymers with Nanopatterned Roughness for MEMS/NEMS," IEEE Second Conference on Nanoscale Devices and System Integration, Houston, Texas, April 2005.
84. Nanosystems Interdepartmental Seminar - "Nanotribology of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices," Departments of Mechanical and Process Engineering, Information Technology and Electrical Engineering, and Physics, Eidgenoessische Technische Hochschule (ETH), Zurich, Switzerland, April 2005.
85. Speaker and Session Chair - European Commission Workshop on Research Training in Nanosciences and Nanotechnologies: Current Status and Future Needs, Brussels, Belgium, April 2005.
86. Plenary Lecture - "Nanotribology and Nanomechanics," 15th International Conference on Wear of Materials, San Diego, California, April 2005.
87. Invited Lead Lecture - "Adhesion, Friction and Wear Properties of Biomolecules Against Self Assembled Monolayer Coated Surfaces for Biological Applications," Cancun-2005 - Scanning Probe Microscopy, Sensors and Nanostructures, Cancun, Mexico, June 2005.
88. Keynote Lecture - "Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices," Scanning Probe Microscopy (SPM) Israel 2005, Holon, Israel, June 2005.
89. Institute Colloquium Lecture, "Nanotribology, Nanomechanics, and Material Characterization Studies Using Scanning Probe Microscopy," Weizmann Institute of Science, Rehovot, Israel, June 2005.
90. Engineering Colloquium, "Nanotribology," Faculty of Engineering, Cairo University, Cairo, Egypt, June 2005.

91. Department Colloquium – “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices,” Physics Department, L’Oreal Research, Paris, France, June 2005.
92. Institute Colloquium Lecture– “Nanotribology, Nanomechanics, and Material Characterization Studies Using Scanning Probe Microscopy,” Joint Colloquium College de France and Ecole Superieure de Physique et Chimie Industrielles (ESPCI), Universite Paris 6, Paris, France, July 2005.
93. Keynote Lecture - “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices,” Tenth International Conference on Metrology and Properties of Engineering Surfaces, Saint Etienne, France, July 2005.
94. Institute Colloquium Lecture - “Nanotribology, Nanomechanics and Materials Characterization Studies Using Scanning Probe Microscopy,” Laboratory of Tribology and Systems Dynamics, Ecole Centrale de Lyon, Ecully, France, July 2005.
95. Institute Colloquium Lecture– “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices,” General Electric Global Research Center, Schenectady, New York, Oct. 2005.
96. Lab Colloquium – “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices,” Intel Corporation, Santa Clara, California, Jan. 2006.
97. Lab Colloquium – “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices,” CNR – Istituto per la Microelettronica e Microsistemi (IMM), Catania, Italy, Feb. 2006).
98. Keynote Speaker – “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices,” International Workshop on Probing the Nanoscale World of Materials II: Organization and Properties, University of Palermo, Palermo, Italy, Feb. 2006.
99. Academy of the University Address – “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices,” University of Messina, Messina, Italy, Feb. 2006
100. Expert Speaker – “Introduction and Trends in Nanotechnology,” European Aeronautic Defence and Space (EADS) Corporate Research Center, Munich, Germany, March 2006.
101. Lead Speaker – “Nanotribology, Nanomechanics, and Materials Characterization Studies Using Scanning Probe Microscopy,” Symposium on Nanoscale Imaging and Metrology of Devices with Innovative Materials, The European-MRS Spring Meeting, Nice, France, June 2006.
102. Lead Invited Speaker – “Characterization of Patterned Polymers with Micro- and Nanostructures for Superhydrophobicity,” Scanning Probe Microscopy, Sensors and Nanostructures, Montpellier 2006, La Grande Motte, France, June 2006.
103. Institute Colloquium Lecture - “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices,” NanoBioEngineering Lab (CREBEC), Barcelona Science Park, Barcelona, Spain, June 2006.
104. Keynote Speaker - “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices,” Eighth Biennial ASME Conference on Engineering Systems Design and Analysis (ESDA) 2006, Turin, Italy, July 2006.
105. Institute Colloquium Lecture - “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices,” Micro & Nanotechnologies, Centro Ricerche Fiat (CRF), Torino, Italy, July 2006.
106. Institute Colloquium Lecture - “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices,” EMPA - Swiss Federal Laboratory for Materials Testing and Research, Thun, Switzerland, Sept. 2006.
107. Institute Colloquium Lecture - “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices,” The Institute of Microtechnology, University of Neuchatel, Switzerland, Sept. 2006.
108. Institute Colloquium Lecture - “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices,” Laboratoire d’Electronique de Technologie de l’Information, Commissariat a de l’Energie Atomique, Grenoble, France, Sept. 2006.
109. Keynote Speaker, “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices,” Fifth AITC-AIT International Conference on Tribology, Parma, Italy, Sept. 2006.
110. Institute Colloquium Lecture - “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices,” Laboratoire de Physique des Solides, Universite Paris Sud-XI, Orsay, France, Nov. 2006.
111. Institute Colloquium Lecture - “Nanotribology, Nanomechanics, and Materials Characterization Studies Using Scanning Probe Microscopy,” Laboratoire de Physique de la Matiere Condensee et Nanostructures, University Claude Bernard Lyon I, Lyon, France, Nov. 2006.

112. Institute Colloquium Lecture, "Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices," Microfluidics, MEMS and Nanostructures Laboratory, Ecole Supérieure de Physique et de Chimie Industrielles (ESPCI), Paris, France, Nov. 2006.
113. Plenary Lecture, "Nanotribology, Nanomechanics, and Materials Characterization Studies Using Scanning Probe Microscopy," Materials Science and Materials Mechanics at the Nanoscale, Nanomec-06, Nov. 2006.
114. Plenary Lecture, "Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices," Materials Science and Materials Mechanics at the Nanoscale, Nanomec-06, Nov. 2006.
115. College of Engineering Colloquium Lecture, "Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices," University of California, Santa Cruz, California, Dec. 2006.
116. Materialwissenschaftliches Colloquium Lecture- "Nanotribology, Nanomechanics, and Materials Characterization Studies Using Scanning Probe Microscopy," Institut fuer Metallkunde de Universitaet Stuttgart and Max-Planck Institut fuer Metallforschung Stuttgart, Germany, Jan. 2007.
117. Institute Colloquium Lecture- "Nanotribology, Nanomechanics, and Materials Characterization Studies Using Scanning Probe Microscopy," MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands, March 2007.
118. Plenary Lecture, "Surface Characterization and Adhesion and Friction Properties of Superhydrophobic and Hydrophilic Leaf Surfaces and Optimization of Micro- and Nanopatterned Surfaces for Superhydrophobicity," Viennano 07, 2nd International Conference on Micro- and Nano- Technology, Vienna Austria, March 2007.
119. Institute Colloquium Lecture- "Nanotribology, Nanomechanics, and Materials Characterization Studies Using Scanning Probe Microscopy," Erich Schmid Institute of Materials Science, Austrian Academy of Science and Department of Materials Physics, University of Leoben, Leoben, Austria, March 2007.
120. Institute Colloquium Lecture- "Nanotribology, Nanomechanics, and Materials Characterization Studies Using Scanning Probe Microscopy," Institut fuer Werkstoffwissenschaften, Universitaet Erlangen-Nurnberg, Germany, March 2007.
121. Plenary Lecture, "Structural, Nanomechanical, and Nanotribological Characterization of Human Hair Using Atomic Force Microscopy and Nanoindentation," Symposium on Bioinspired Materials at 71st Annual Meeting of the Deutsche Physikalische Gesellschaft and DPG-Spring Meeting of the Condensed Matter Division, Regensburg, Germany, March 2007.
122. Physikalisch-Chemisches Kolloquium, "Nanotribology, Nanomechanics, and Materials Characterization Studies Using Scanning Probe Microscopy," Max-Planck Institute for Polymer Research, Mainz, Germany, April 2007.
123. Lab Colloquium Lecture- "Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices," Corporate Sector Research and Advanced Engineering Microsystems, Robert Bosch Inc., Stuttgart, Germany, April 2007.
124. Botanisches Kolloquium Lecture- "Surface Characterization and Adhesion and Friction Properties of Superhydrophobic and Hydrophilic Leaf Surfaces and Optimization of Micro- and Nanopatterned Surfaces for Superhydrophobicity," Nees-Institute for Biodiversity of Plants, University of Bonn, Germany, April 2007.
125. Institute Colloquium Lecture- "Nanotribology, Nanomechanics, and Materials Characterization Studies Using Scanning Probe Microscopy," CNRS - Centre de Recherche Paul Pascal, and Universite Bordeaux I, Bordeaux, France, May 2007.
126. Institute Colloquium Lecture- "Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices," Institut fuer Physik, Universitaet Augsburg, Augsburg, Germany, May 2007.
127. Invited Lecture, "Lotus Effect: Roughness-Induced Superhydrophobic Surfaces," 6th European Science Foundation (ESF) Nanotribology Workshop, Sardinia, Italy, May, 2007.
128. Lab Colloquium Lecture- "Nanotribology, Nanomechanics, and Materials Characterization Studies Using Scanning Probe Microscopy," Physical and Engineering Sciences, Unilever Corporate Research, Colworth Science Park, Sharnbrook, U.K., May 2007.
129. Lab Colloquium Lecture- "Nanotribology, Nanomechanics, and Materials Characterization Studies Using Scanning Probe Microscopy," Laboratory for Nanoscale Materials Science, EMPA-Swiss Federal Laboratory for Materials Testing and Research, Duebendorf, Switzerland, June 2007.
130. Invited Lecture, "Nanotribology, Nanomechanics, and Materials Characterization Studies Using Scanning Probe Microscopy," 17th International Vacuum Congress (IVC-17), 13th International Conference in Surface Science (ICSS-13), and International Conference on Nano Science and Technology (ICN+T 2007), Stockholm, Sweden, July 2007.

131. Lab Colloquium Lecture- “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices and Biomimetics,” IBM Zurich Research Laboratory, Ruschlikon, Switzerland, July 2007.
132. Institute Colloquium Lecture- “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices and Biomimetics,” Scuola Universitaria Professionale della Svizzera Italiana (SUPSI), Lugano, Switzerland, July 2007.
133. Highlight Lecture, “Nanotribology, Nanomechanics, and Materials Characterization Studies Using Scanning Probe Microscopy,” Euromat 2007, European Congress on Advanced Materials and Processes, Nurnberg, Germany, Sept. 2007.
134. Keynote Lecture, “Structural, Nanomechanical, and Nanotribological Characterization of Human Hair and Conditioner Using AFM and Nanoindentation,” 15th International Hair-Science Symposium of DWI – Hair S ’07, Bad Staffelstein, Germany, Sept. 2007.
135. Institute Colloquium Lecture- “Nanotribology, Nanomechanics, and Nano/biotechnology,” Center for Research on Interface Structures and Phenomenon (CRISP), Yale University, New Haven, Connecticut, Oct. 2007.
136. Plenary Lecture, “The Effect of Surface Texture on Wetting on Patterned Superhydrophobic Surfaces,” 68th Conference on Glass Problems, Glass Manufacturing Industrial Council, (GMIC), Columbus, Ohio, Oct. 2007.
137. Institute Colloquium Lecture- “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices and Biomimetics,” Natural Institute of Metrology, Standardization and Industrial Quality (INMETRO), Rio de Janeiro, Brazil, Dec. 2007.
138. Institute Colloquium Lecture- “Nanotribology, Nanomechanics, and Materials Characterization Studies and Applications to Bio/Nanotechnology and Biomimetics,” California NanoSystems Institute (CNSI), University of California, Santa Barbara, California, Feb. 2008.
139. Invited Lecture, “Nanotribology, Nanomechanics, and Materials Characterization Studies and Applications to Bio/Nanotechnology and Biomimetics,” Ninth International Tribology Conference, The South African Institute of Tribology, Pretoria, South Africa, April 2008.
140. Invited Lecture, “Structural, Nanomechanical, and Nanotribological Characterization of Human Hair and Conditioner using AFM and Nanoindentation,” R&D Hair Care, Amka Products, Pretoria, South Africa, April 2008.
141. Institute Colloquium Lecture- “Nanotribology, Nanomechanics, and Materials Characterization Studies and Applications to Bio/Nanotechnology and Biomimetics,” Center for Materials Engineering, University of Capetown, South Africa, April 2008.
142. Institute Colloquium Lecture- “Nanotribology, Nanomechanics, and Materials Characterization Studies and Applications to Bio/Nanotechnology and Biomimetics,” Department of Chemistry and Polymer Science, University of Stellenbosch, South Africa, April 2008.
143. Institute Colloquium Lecture- “Lotus Effect: Roughness-Induced Superhydrophobic Surfaces,” Comision Nacional de Energia Atomica (CNEA), Buenos Aires, Argentina, May 2008.
144. Institute Colloquium Lecture- “Lotus Effect: Roughness-Induced Superhydrophobic Surfaces,” Faculty of Physical Sciences and Mathematics, Universidad de Chile, Santiago, Chile, May, 2008.
145. Institute Colloquium Lecture- “Lotus Effect: Roughness-Induced Superhydrophobic Surfaces,” National Competence Center for Research in Nanoscale Science (NCCR), Institute for Physics, University of Basel, Switzerland, June 2008.
146. Invited Lead Lecture, “Nanotribology, Nanomechanics, and Materials Characterization Studies and Applications to Bio/Nanotechnology and Biomimetics,” Biotechnical Functionalization of Renewable Polymeric Materials, sponsored by COST (European Cooperation in the Field of Scientific and Technical Research), Varna, Bulgaria, Sept. 2008.
147. Invited Lead Lecture, “Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices and Biomimetics,” Workshop on Multifunctional Molecular and Hybrid Devices, Commissariat a l Energie Atomique (CEA) Saclay, Paris, France, Oct. 2008.
148. Institute Colloquium Lecture- “Nanotribology, Nanomechanics, and Materials Characterization Studies and Applications to Bio/Nanotechnology and Biomimetics,” Center for Nano Technology (CeNTech) and Physics Institute of University of Muenster, Muenster, Germany, Dec. 2008.
149. Institute Colloquium Lecture- “Nanotribology, Nanomechanics, and Materials Characterization Studies and Applications to Bio/Nanotechnology and Biomimetics,” NNSA Center for Prediction of Reliability, Integrity and Survivability of Microsystems (PRISM), Birck Nanotechnology Center, Purdue University, West Lafayette, Indiana, March 2009; Posted on www.nanohub.org.

150. Keynote Lecture, "Nanotribology, Nanomechanics, and Materials Characterization Studies and Applications to Bio/Nanotechnology and Biomimetics," Viennano 09, 3rd Vienna International Conference on Nano Technology, Vienna, Austria, March 2009.
151. Plenary Lecture, "Nanotribology and Nanomechanics of MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices and Biomimetics," IEEE Fifth Encounter with Biomedical Engineering - New Biomedical Technologies, Unidad Profesional Interdisciplinaria en Biotecnología of the Instituto Politécnico Nacional (UPIBI-IPN), Mexico City, Mexico, April 2009.
152. Lab Colloquium Lecture- "Nanotribological Characterization and Degradation Mechanisms of Molecularly-Thick Boundary Layers of Novel Perfluoropolyether Lubricants using Atomic Force Microscopy and UHV Tribometer," Science and Technology, Corning Inc., Corning, New York, May 2009.
153. Invited Lead Lecture, "Lotus Effect: Surfaces with Roughness-Induced Superhydrophobicity, Self-Cleaning, and Low Adhesion," Eleventh International Scanning Probe Microscopy (ISPM) Conference, Madrid, Spain, June 2009.
154. Keynote Inaugural Lecture, "Lotus Effect: Surfaces with Roughness-Induced Superhydrophobicity, Self-Cleaning, and Low Adhesion," FANAS Symposium on Modeling of Adhesion and Friction at the Nanoscale, Second South-East European Conference on Computational Mechanics (SEECCM), Rhodes, Greece, June 2009.
155. Lab Colloquium Lecture-, "Nanotribological Characterization and Degradation Mechanisms of Molecularly-Thick Boundary Layers of Novel Perfluoropolyether Lubricants using Atomic Force Microscopy and UHV Tribometer," Konica Minolta Opto Inc., Osaka, Japan, Aug. 2009.
156. Keynote Lecture, "Nanotribology, Nanomechanics, and Materials Characterization Studies and Applications to Bio/Nanotechnology and Biomimetics," European Congress and Exhibition on Advanced Materials and Processes, Euromat 2009, Glasgow, Scotland, Sept. 2009.
157. Plenary Lecture, "MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices and Biomimetics," Twentieth Micromechanics and Microsystems Europe (MME) Workshop, Toulouse, France, Sept. 2009.
158. Institute Colloquium Lecture- "Lotus Effect: Surfaces with Roughness-Induced Superhydrophobicity, Self-Cleaning, and Low Adhesion," Micro & Nano Systems Laboratory, LAAS-CNRS, Toulouse, France, Sept. 2009.
159. Keynote Lecture, "Nanotribology, Nanomechanics, and Materials Characterization Studies and Applications to Bio/Nanotechnology and Biomimetics," Joint ICTP-FANAS Conference on Trends in Nanotribology, International Center for Theoretical Physics (ICTP), Miramare-Trieste, Italy, Oct. 2009.
160. Lab Colloquium Lecture- "Nanotribology, Nanomechanics, and Materials Characterization Studies and Applications to Bio/Nanotechnology and Biomimetics," Corporate Research, Procter & Gamble, Cincinnati, Ohio, Nov. 2009.
161. Keynote Lecture, "Nanotribology, Nanomechanics, and Materials Characterization Studies and Applications to Bio/Nanotechnology and Biomimetics," International Conference on Tribology BALTTTRIB 2009, Kaunas, Lithuania, Nov. 2009.
162. Institute Colloquium Lecture- "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology," Dept. of Mechanical Engineering, United Arab Emirates University, Al-Ain, UAE, Dec. 2009.
163. Institute Colloquium Lecture- "MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices and Biomimetics," Dept. of Physics, United Arab Emirates University, Al-Ain, UAE, Dec. 2009.
164. Institute Colloquium Lecture- "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology," Center of Research Excellence in Nanotechnology (CENT), King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia, Dec. 2009.
165. Department Seminar Speaker, "MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices and Biomimetics," Department of Mechanical Engineering, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia, Dec. 2009.
166. Keynote Speaker, "MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices and Biomimetics," SPIE Smart Structures/NDE, San Diego, California, March 2010.
167. Institute Colloquium Lecture- "MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices and Biomimetics," King Abdullah Institute of Nanotechnology (KAIN) and Prince Sultan Institute of Nanotechnology (PSATRI), King Saud University, Riyadh, Saudi Arabia, March 2010.
168. Institute Colloquium Lecture- "Nanotribology of Human Hair and Conditioner and Skin Creams using Atomic Force Microscopy and Nanoindentation," Unilever R&D Center, Trumbull, Connecticut, Aug. 2010.
169. Institute Colloquium Lecture- "Biomimetics – Lessons from Nature," State Key Laboratory of Nonlinear Mechanics, Beijing, China, Sept. 2010.

170. Institute Colloquium Lecture- "Biomimetics – Lessons from Nature," College of Engineering Peking University, Beijing, China, Sept. 2010.
171. Institute Colloquium Lecture- "Biomimetics – Lessons from Nature," Lanzhou Institute of Chemical Physics, Lanzhou, China, Sept. 2010.
172. Plenary Lecture, "Biomimetics – Lessons from Nature," The Third International Conference of Bionic Engineering, Zhuhai, China, Sept. 2010.
173. Invited Lead Lecture, "Biomimetics – Lessons from Nature," Ringberg Symposium Molecular Bionics – From Biomineralization to Functional Materials, Rottach-Egem, Germany, Oct. 2010.
174. Institute Colloquium Lecture- "Biomimetics – Lessons from Nature," Institute for Applied Physics and Institute for Nanotechnology, Karlsruhe Institute of Technology, Karlsruhe, Germany, Oct. 2011.
175. Keynote Lecture, "Structural, Nanomechanical, and Nanotribological Characterization of Human Hair and Conditioner using AFM and Nanoindentation," Fourth Avant Hair Care Symposium, ISP Corporate Research Center, Wayne, New Jersey, Dec. 2010.
176. Plenary Lecture, "Nanotribology, Nanomechanics, and Materials Characterization Studies and Applications to Bio/nanotechnology and Biomimetics," Sixth Australasian Congress on Applied Mechanics (ACAM 6), Perth Australia, Dec. 2010.
177. Institute Colloquium Lecture- "Nanotribology, Nanomechanics, and Materials Characterization Studies and Applications to Bio/nanotechnology and Biomimetics," School of Mechanical and Manufacturing Engineering, University of New South Wales, Sydney, Australia, Dec. 2010.
178. Featured Dinner Speaker, "Lotus Effect: Surfaces with Roughness-Induced Superhydrophobicity, Self Cleaning and Low Adhesion," National Academies Chemical Sciences Roundtable, Board on Chemical Sciences and Technology, Washington, D.C., Feb. 2011.
179. Invited Speaker, "Lotus Effect: Surfaces with Roughness-Induced Superhydrophobicity, Self Cleaning and Low Adhesion," Micro/Nano Seminar, School of Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts, March 2011.
180. Invited Speaker, "Fabrication and Characterization of Biomimetic Functional Materials," 2011 DFG-NSF Research Conference: Bioinspired Design and Engineering of Novel Functional Materials, New York, New York, March 2011.
181. Keynote Lecture, "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology," 10th International Tribology Conference of the South African Institute of Tribology, Pretoria, South Africa, April 2011.
182. Institute Colloquium Lecture- "Structural, Nanomechanical, and Nanotribological Characterization of Human Hair and Conditioner using AFM and Nanoindentation," NCS Personal Care Division, The Lubrizol Corp., Cleveland, Ohio, May 2011.
183. Keynote Lecture, "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology," 12th International Conference on Tribology – SERBIATRIB '11, Kragujevac, Serbia, May 2011.
184. Institute Colloquium Lecture- "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology," School of Engineering, University of Belgrade, Serbia, May 2011.
185. Plenary Speaker, "Biomimetics – Lessons from Nature," Third European Conference on Tribology (Ecotrib 2011) and Fourth Vienna International Conference on Nanotechnology (Viennano '11), Vienna, Austria, June 2011.
186. Institute Colloquium Lecture- "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/Nanotechnology and Biomimetics"; "MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices and Biomimetics"; "Biomimetics: Lessons from Nature," Institute of Mechanics and Advanced Materials (IMAM), Cardiff University, Cardiff, U.K., June 2011.
187. Institute Colloquium Lecture- "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/Nanotechnology and Biomimetics," National Center for Advanced Tribology (nCAT), University of Southampton, Southampton, U.K., June 2011.
188. Institute Colloquium Lecture- "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/Nanotechnology and Biomimetics," Laser Processing Center, School of Mechanical, Aerospace and Civil Engineering, University of Manchester, Manchester, U.K., June 2011.
189. Institute Colloquium Lecture- "Biomimetics: Lessons from Nature," Faculty of Engineering, University of Nottingham, U.K., June 2011.
190. Keynote Lecture, "Bio- & Nanotechnology and Biomimetics," National Nanotechnology Center for Energy (CNNe), Medellin, Colombia, Aug. 2011.

191. Keynote Lecture, "Biomimetics: Lessons from Nature," Frontiers in Surface Engineering of Biomaterials Symposium, Materials Science and Technology Conference, Columbus, Ohio, Oct. 2011.
192. Invited Lecture, "Grand Challenge: Design and Modeling of Nanostructured Smart Adhesion Surfaces," U.S.-Japan Workshop on Bio-Inspired Sensing and Bio-Inspired Actuation (BSBA) Technology, University of California, Berkeley, California, Nov. 2011.
193. Invited Lecture, "Fabrication and Characterization of Multi-level Hierarchical Structural Surfaces Inspired by Lotus Effect and Gecko Adhesion," Royal Society of Chemistry Conference - Faraday Discussion 156: Tribology, Southampton, UK, April 2012.
194. Institute Colloquium Lecture- "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology and Biomimetics," Center of Research Excellence in Nanotechnology (CENT), King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia, April 2012.
195. College Seminar, "MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices and Biomimetics," College of Engineering Sciences, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia, April 2012.
196. College Seminar, "Biomimetics – Lessons from Nature," College of Engineering, University of Kragujevac, Kragujevac, Serbia, May 2012.
197. Keynote Lecture, "Biomimetics – Lessons from Nature," Symposium on Mining Smartness from Nature, Fourth International Conference on Smart Materials, Structures and Systems (CIMTEC), Montecatini Terme, Italy, June 2012.
198. College Seminar, "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology and Biomimetics," Faculty of Engineering, University of Pisa, Pisa, Italy, June 2012.
199. Institute Colloquium, "Biomimetics – Lessons from Nature," Scuola Superiore Sant'Anna, Pisa, Italy, June 2012.
200. Keynote Lecture, "Biomimetics: Lessons from Nature," Conference of Mechanical Engineering Ph.D. Students of China, Harbin, China, July 2012.
201. College Seminar, "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology and Biomimetics," School of Mechatronics Engineering, Harbin Institute of Technology, Harbin, China, July 2012.
202. College Seminar, "MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices and Biomimetics," School of Mechatronics Engineering, Harbin Institute of Technology, Harbin, China, July 2012.
203. Lead Lecture, "Biomimetics: Lessons from Nature," ASME/STLE Joint Tribology Conference, Denver, Colorado, Oct. 2012.
204. College Seminar, "Biomimetics: Lessons from Nature," University of Michigan, Ann Arbor, Michigan, Oct. 2012.
205. Institute Colloquium Lecture- "Biomimetics: Bioinspired Superhydrophobic, Self-Cleaning/ Antifouling and Low Drag Surfaces," Coatings and Glass Innovation Centers, PPG Industries, Inc., Allison Park, Pennsylvania, Jan. 2013.
206. Lead Plenary Lecture, "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology," Third International Tribology Symposium of IFToMM (International Federation for the Promotion of Mechanism and Machine Science), Lulea, Sweden, March 2013.
207. Plenary Lecture, "Biomimetics: Bioinspired Superhydrophobic, Self-Cleaning/ Antifouling and Low Drag Surfaces," Third International Tribology Symposium of IFToMM (International Federation for the Promotion of Mechanism and Machine Science), Lulea, Sweden, March 2013.
208. Institute Colloquium Lecture- "Biomimetics: Bioinspired Superhydrophobic, Self-Cleaning/ Antifouling and Low Drag Surfaces," Max Planck Institute of Colloids and Interfaces, Potsdam, Germany, May 2013.
209. Institute Colloquium Lecture- "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology," and "Biomimetics: Bioinspired Superhydrophobic, Self-Cleaning/ Antifouling and Low Drag Surfaces," State Key Laboratory of Tribology, Tsinghua University, Beijing, China, June 2013.
210. Institute Colloquium Lecture- "Biomimetics: Bioinspired Superhydrophobic, Self-Cleaning/ Antifouling and Low Drag Surfaces," National Center for Nanoscience and Technology, Beijing, China, June 2013.
211. Invited Speaker, "Controlled Manipulation, Nanotribology and Nanoindentation of Nano-objects in Dry and Liquid Environments," Nanomeasure 2013 Symposium, Biological and Chemical Research Center, University of Warsaw, Warsaw, Poland, June 2013.
212. Keynote Lecture, "Biomimetics: Bioinspired Superomniphobic, Self-cleaning/Antifouling and Low Drag Surfaces," SPIE Optics + Photonics, NanoScience & Engineering, San Diego, California, Aug. 2013.
213. Plenary Lecture, "Biomimetics: Bioinspired Superomniphobic, Self-cleaning/Antifouling and Low Drag Surfaces," Fifth World Tribology Congress, WTC2013, Torino, Italy, Sept. 2013.

214. Keynote Lecture, "MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices and Biomimetics," Ecotribology Track, Fifth World Tribology Congress, WTC2013, Torino, Italy, Sept. 2013.
215. Keynote Lecture, "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology and Biomimetics," Viennano' 13-Nanotechnology Track, Fifth World Tribology Congress, WTC2013, Torino, Italy, Sept. 2013.
216. Keynote Lecture, "Lotus Effect: Surfaces with Roughness-Induced Superhydrophobicity, Self-cleaning and Low Adhesion," Biomimetics Track, Fifth World Tribology Congress, WTC2013, Torino, Italy, Sept. 2013.
217. Lecture to College wide Faculty, "Science and Technology (S & T) Policy: My Experiences, What is at Stake and Why Should Scientists Participate?," College of Engineering, The Ohio State University, Columbus, Ohio, April 2014.
218. Chair and Discussion Moderator, Revolutionary Future Perspectives Session, US-EU-Japan Tenth International Nanotechnology Conference on Communication and Cooperation, Gaithersburg, Maryland, May 2014.
219. Opening Plenary Lecture, "Biomimetics: Bioinspired Superomniphobic, Self-cleaning/Antifouling and Low Drag Surfaces," CECAM International Workshop on Superhydrophobicity, Bubble Stability, and Heterogeneous Nucleation, Rome, Italy, June 2014.
220. Lunchtime Colloquium, "Biomimetics: Bioinspired Superomniphobic, Self-cleaning/Antifouling and Low Drag Surfaces," web linked to other US sites, Government Accountability Office (GAO), Washington, D.C., July 2014.
221. College Seminar, "Biomimetics: Bioinspired Superomniphobic, Self-cleaning/Antifouling and Low Drag Surfaces," School of Mechatronics Engineering, Harbin Institute of Technology, Harbin, China, Aug. 2014.
222. Keynote Lecture, "Governance of Nanotechnology and the Legislation in Preparation," 2014 NSF Nanoscale Science and Engineering Grantees Conference, Arlington, Virginia, Dec. 2014.
223. College of Engineering Sciences Seminar Speaker, "U. S. Science and Technology (S & T) Policy: What is at Stake and Why should Scientists Participate?: A Fellow's Perspective," King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia, Dec. 2014.
224. Keynote Lecture, "Friction, Wear and Mechanical Behavior of Nano-Objects on the Nanoscale," International Scanning Probe Microscopy Conference (ISPM Conference Rio 2015), Buzio, Brazil, June 2015.
225. Institute Colloquium, "Biomimetics: Bioinspired Superomniphobic, Self-cleaning/Antifouling and Low Drag Surfaces," National Nanotechnology Laboratory, National Center for Research on Energy and Materials, Campinas, Brazil, Aug. 2015.
226. Institute Colloquium, "Biomimetics: Bioinspired Superomniphobic, Self-cleaning/Antifouling and Low Drag Surfaces," Max-Planck Institute for Polymer Research, Mainz, Germany, October 2015.
227. Physical Chemistry Colloquium, "Biomimetics: Bioinspired Mechanically Durable, Nanostructured Surfaces for Low Drag and Super-Philicity/Phobicity," Department of Physical and Theoretical Chemistry, University of Oxford, Oxford, UK, November 2015.
228. Keynote Lecture, "Biomimetics: Bioinspired Superomniphobic, Self-Cleaning/Antifouling and Low Drag Surfaces," 39th Annual Meeting of the Adhesion Society, San Antonio, Texas, Feb. 2016.
229. Keynote Lecture, "Biomimetics: Bioinspired Superomniphobic, Self-Cleaning/Antifouling and Low Drag Surfaces," International Conference on Bio-Inspired Materials - Sustainable Materials Inspired by the Living World, SMILE2016, Rueil-Malmaison (Paris), France, April 2016.
230. Keynote Speaker, "Biomimetics: Bioinspired Superoleophilic/phobic, Self-Cleaning/Antifouling and Low Drag Surfaces," Third Annual Nano Day 2016, Institute of Materials Science and Nanotechnology and The National Nanotechnology Research Center (UNAM), Bilkent University, Ankara, Turkey, May 2016.
231. Invited Lecturer, "Biomimetics: Bioinspired Liquiphilic/phobic, Self-Cleaning/Antifouling and Low Drag Surfaces," DK Nanocell Summer School (organized by Johannes Kepler University, Linz, Austria), St. Wolfgang, Austria, July 2016.
232. Plenary Speaker, "Biomimetics: Bioinspired Liquiphilic/phobic, Self-Cleaning/Antifouling and Low Drag Surfaces," The Third International Conference on Bioinspired and Biobased Chemistry & Materials - Nature Inspires, Creativity Engineers (NICE 2016), Nice, France, Oct. 2016.
233. College of Engineering Seminar Speaker, "Science and Technology (S & T) Policy: What is at Stake and Why Should Scientists Participate?," Texas A & M University, College Station, Texas, Nov. 2016.
234. Institute Colloquium, "Biomimetics: Bioinspired Liquiphilic/phobic, Self-Cleaning/Antifouling and Low Drag Surfaces," Indian Institute of Technology, Ropar, India, Dec. 2016.
235. Institute Colloquium Lecture- "MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices," Institute of Nano Science and Technology, Mohali, India, Dec. 2016.
236. Institute Colloquium Lecture- "MEMS/NEMS and BioMEMS/BioNEMS Materials and Devices," CSIR - Central Scientific Instruments Organization, Chandigarh, India, Dec. 2016.

237. Opening Keynote Speaker, "An Emerging Nanotechnology - Bioinspired Hierarchically Nanostructured Liquiphilic/phobic Surfaces: Characterization, Nanofabrication, and Scale-up," Eighth Micronarc Alpine Meeting (mAm), Micro, Nano, and Emerging Technologies for Commercialization Education Foundation (MANCEF), Villars-sur-Ollon, Switzerland, Feb. 2017.
238. Skype Institute Colloquium, "Biomimetics: Bioinspired Liquiphilic/phobic, Self-Cleaning/Antifouling and Low Drag Surfaces," School of Bio Sciences & Technology, Vellore University, Vellore, India, March 2017.
239. Plenary Lecture, "Biomimetics: Bioinspired Liquiphilic/phobic, Self-Cleaning/Antifouling and Low Drag Surfaces," Interdisciplinary Doctoral Schools (DK) of Biointerface and Unraveling Advanced 2D Materials, Vienna University of Technology, Vienna, Austria, April 2017.
236. Corporate Colloquium, "Bioinspired Mechanically Durable Superliquiphobic/philic Surfaces," Brewer Science Inc., Rolla, Missouri, May 2017.
237. Keynote Lecture, "Biomimetics: Bioinspired Liquiphilic/phobic, Self-Cleaning/Antifouling and Low Drag Surfaces," International Summer School on Polyelectrolytes Systems, VII All-Russian Kargin's Conference - Polymers 2017, Lomonosov Moscow State University, Moscow, Russia, June 2017.
238. Keynote Opening Lecture, "Biomimetics: Bioinspired Liquiphilic/phobic, Self-Cleaning/Antifouling and Low Drag Surfaces," International Symposium on Advanced Nanomaterials – Chemistry, Physics and Biology (ISAN 2017), Russian Academy of Sciences, Peterhof, Russia, June 2017.
239. Keynote Lecture, "Biomimetics: Bioinspired Liquiphilic/phobic, Self-Cleaning/Antifouling and Low Drag Surfaces," World Tribology Congress, Beijing, China, Sept. 2017.
240. Lab Colloquium Lecture, "Bioinspired Mechanically Durable Superliquiphobic/philic Surfaces," Ford Research & Innovation Center, Dearborn, Michigan, Sept. 2017.
241. Plenary Lecture, "Bio- & Nanotechnology: History of NNI, R&D Investment and Output, and Challenges," Panel on Recent Advances in Nanotechnology, ASME NanoEngineering for Energy and Sustainability Steering Committee (NEES), ASME International Mechanical Engineering Congress, Tampa, Florida, Nov. 2017.
242. Opening Plenary Lecture, "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology," Ninth International Conference on Tribology - BALTRIB 2017, Kaunas, Lithuania, Nov. 2017.
243. Plenary Lecture, "Biomimetics: Bioinspired Liquiphilic/phobic, Self-Cleaning/Antifouling and Low Drag Surfaces," Ninth International Conference on Tribology - BALTRIB 2017, Kaunas, Lithuania, Nov. 2017.
244. Plenary Lecture, "Bioinspired Mechanically Durable Superliquiphilic/phobic Surfaces," LUBMAT 2018, Lubricants, Tribology and Condition Monitoring International Conference and Exhibition, IK4-TEKNIKER, San Sebastian, Spain, June 2018.
245. Academic Lecture, "Bioinspired Mechanically Durable Superliquiphilic/phobic Surfaces," Third Intelligent Robotics International Summer School, Harbin Institute of Technology, Harbin, China, July 2018.
246. Plenary Lecture, "Structural, Nanomechanical, and Nanotribological Characterization of Human Hair and Conditioner Using AFM and Nanoindentation," Advances in Cosmetic Formulation Design, Engineering Conferences International, Durham, North Carolina, July 2018.
247. Distinguished Banquet Lecture, "Historical Evolution of Magnetic Data Storage Devices and Related Conferences," The 27th ASME Annual Conference on Information Storage and Processing Systems and Micromechatronics for Information and Precision Equipment (ISPS/MIPE), San Francisco, CA, Aug. 2018.
248. **Science Sundays Public Lecture**, "[Lessons from Nature: Bio-inspired Surfaces for Green Science and Technology](#)," Free Arts and Sciences Public Lecture Series hosted by The Ohio State University, Columbus, Ohio, October 2018.
249. Plenary Speaker, "Getting Every Drop: Bioinspired Superliquiphilic/phobic Surfaces for Packaging," California Dreaming: Scientific Seminar for Emerging Technologies, Society of Cosmetic Chemists California, UCLA, Los Angeles, CA, Nov. 2018.
250. Plenary Speaker, "Bioinspired Materials for Water Supply and Management: Water collection, Water purification, and Oil-Water Separation," Workshop on Recent Advances in Water Collection and Purification, ASME NanoEngineering for Energy and Sustainability Steering Committee (NEES), ASME International Mechanical Engineering Congress, Pittsburgh, PA, Nov. 2018.
251. College of Engineering Seminar Speaker, "Science and Technology (S & T) Policy: What is at Stake and Why Should Scientists Participate?," Texas A & M University, College Station, Texas, Nov. 2018.
252. SPREE Seminar Speaker, "Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology and Biomimetics," Center for Science and Protection of Engineering Environments, Northwestern University, Evanston, Illinois, Jan. 2019.

253. College of Engineering Seminar Speaker, “Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology and Biomimetics,” Baskin College of Engineering, University of California at Santa Cruz, Santa Cruz, California, Jan. 2019.
254. **TEDx Talk**, “Lessons from Nature: Bioinspired Surfaces for Green Technology,” 2019 TEDxOhioStateUniversity Event: Fuse, Columbus, Ohio, Feb. 23, 2019. Attended by 1500 people, a ticketed event; broadcast live.
255. Plenary Speaker, “Nature-Inspired Mechanically Durable and Self-healing Superliquiphilic/phobic Surfaces For Green Tribology,” Seventh European Conference on Tribology 2019 (ECOTRIB 2019), Vienna, Austria, June 2019.
256. College Seminar, “Lessons from Nature: Bioinspired Surfaces for Green Technology,” School of Mechatronics Engineering, Harbin Institute of Technology, Harbin, China, July 2019.
257. Plenary Speaker, “Lessons from Nature: Bioinspired Mechanically Durable and Self-healing Superliquiphobic/philic Surfaces,” First ECI Nature-Inspired Engineering Conference, Engineering Conferences International, Cetraro (Calabria), Italy, Sept. 2019.
258. Keynote Speaker, “Bioinspired Water Collection Methods to Supplement Water Supply,” First ECI Nature-Inspired Engineering Conference, Engineering Conferences International (ECI), Cetraro (Calabria), Italy, Sept. 2019.
259. Opening Plenary Lecture, “Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology,” Tenth International Conference on Tribology - BALTTRIB 2019, Kaunas, Lithuania, Nov. 2019.
260. Plenary Lecture, “Lessons from Nature: Bioinspired Mechanically Durable and Self-healing Superliquiphilic/phobic Surfaces for Green Tribology,” Tenth International Conference on Tribology - BALTTRIB 2019, Kaunas, Lithuania, Nov. 2019.
261. Colloquium Lecture, “Overview of Nanotribology, Nanomechanical Properties and Biomimetics,” Apple Inc, Cupertino, CA, Jan. 2021.
262. Colloquium Lecture, “Overview of Nanotribology, Nanomechanical Properties and Biomimetics,” IBM Almaden Research Center, San Jose, CA, Oct. 2021.
263. ASME TEC Talk, “Lessons from Nature: Bioinspired Mechanically Durable and Self-healing Superliquiphilic/phobic Surfaces,” ASME’ Technical Divisions and Technology Groups, Technical and Engineering Communities (TEC) Sector, ASME, New York, May 2022.
- 264-66. Bioengineering Seminar Mini-Series Speaker, “Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology and Biomimetics,” “Lessons from Nature: Bioinspired Mechanically Durable and Self-healing Superliquiphilic/phobic Surfaces,” and “Bioinspired Water Harvesting from Fog and Condensation to Supplement Safe Water Supply,” School of Engineering, School of Life Sciences, Institute of Bioengineering (IBI) and Institute of Chemical Sciences and Engineering, Ecole Polytechnique Federale de Lausanne (EPFL), Lausanne, Switzerland, June 2022.
267. Invited Speaker, “Lessons from Nature: Bioinspired Mechanically Durable and Self-healing Superliquiphilic/phobic Surfaces,” 7th World Tribology Congress (WTC), Lyon, France, July 2022.
268. Plenary Speaker, “Lessons from Nature: Bioinspired Mechanically Durable and Self-healing Superliquiphilic/phobic Surfaces for Green Tribology,” Eleventh International Conference on Tribology - BALTTRIB 2022, Kaunas, Lithuania, Sept. 2022.
269. Plenary Speaker, “Lessons from Nature: Bioinspired Mechanically Durable and Self-healing Superliquiphilic/phobic Surfaces for Green Tribology,” Eleventh International Conference on Industrial Tribology (ICIT) – IndiaTrib-2022, New Delhi, India, Dec. 2022.
270. Institute Colloquium Lecture, “Lessons from Nature: Bioinspired Mechanically Durable and Self-healing Superliquiphilic/phobic Surfaces,” Indian Institute of Science, Bengaluru, India, Jan. 2023.
271. Mechanical Engineering Seminar, “Nanotribology, Nanomechanics and Materials Characterization Studies and Applications to Bio/nanotechnology and Biomimetics,” Indian Institute of Science, Bengaluru, India, Feb. 2023.
272. Meeting with Students and Young Faculty, “Interactive and Motivational Session for Students and Young Faculty with Prof. Bharat Bhushan, an Indian American Scientist.” Indian Institute of Science, Bengaluru, India, Feb. 2023.
273. BITS Colloquium Lecture, “Lessons from Nature: Bioinspired Mechanically Durable and Self-healing Superliquiphilic/phobic Surfaces,” BITS Pilani, Hyderabad Campus, Telecast Live to all Campuses, India, Feb. 2023.
274. Meeting with Students and Young Faculty, “An Interactive Session for Students and Young Faculty with Prof. Bharat Bhushan, an Indian American Scientist.” BITS Pilani, Hyderabad Campus, India, Feb. 2023.

- 275. BITS Colloquium Lecture, “Lessons from Nature: Bioinspired Mechanically Durable and Self-healing Superliquiphilic/phobic Surfaces,” BITS Pilani, India, March 2023.
- 276. Meeting with Students and Young Faculty, “An Interactive Session for Students and Young Faculty with Prof. Bharat Bhushan, an Indian American Scientist.” BITS Pilani, India, March 2023.
- 277. Invited Lecture, “Lessons from Nature: Bioinspired Mechanically Durable and Self-healing Superliquiphilic/phobic Surfaces,” The Institution of Electronics and Telecommunication Engineers (IETE) Meeting, Central Electronics Engineering Research Institute (CSIR-CEERI), Pilani, India, March 2023.