

Curriculum Vitae

Tindaro Ioppolo Ph.D.

George R. Brown Junior Chair
Assistant Professor
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Education

Doctorate of Philosophy, Mechanical Engineering (2008)

Polytechnic Institute, Brooklyn, New York, USA

(Major: Fluid Mechanics and Heat Transfer; Minor: Applied Mathematics)

Dissertation: *"Whispering Gallery Mode-Based Micro Optical Sensors for Aerospace Applications"*

Advisor: M. V. Ötügen

"Laurea" degree (5 years), Aeronautical Engineering (2001)

University of Palermo, "Univerita' Degli Studi di Palermo", Italy

Thesis: *"Gas Heating at High Temperature by Direct Use of the Fission Fragment Energy for Aerospace Propulsion"* Advisor: P. Barrera, G. Raselli

Professional Experience

- **Assistant Professor (tenure-track)** (08/01/2012 to present), Department of Mechanical Engineering, Southern Methodist University
- **Research Assistant Professor** (09/01/2010 - 06/31/2012), Department of Mechanical Engineering, Southern Methodist University
- **Post-Doctoral Fellow** (02/08/08 - 08/30/2010), Department of Mechanical Engineering, Southern Methodist University, Dallas, TX, USA. Advisor: M. V. Ötügen

Current Professional Memberships

- Member of American Institute of Aeronautics and Astronautics (AIAA)
- Member of American Physics Society (APS)

Funded Research Grant

- **National Science Foundation Grant:** \$400,000 (Fluid Dynamics Program) *"High Sensitivity, Micro-scale Pressure Sensors for Local Pressure Measurements in Fluid Flow"*. August 15, 2011- July 31, 2015.
- **SMU Bobby B. Lyle School of Engineering Grant:** \$25,000 *"Arsenic Speciation Analysis Via Novel Environmental Sensors"*. March 01, 2013-December 31/2013

- NYSEARCH/NGA Grant: \$ 60,000 “Gas Leak Detection Using Colored Nano/Micro-Particles”. June 01/2015-November 31/2015

Patents

1. “A Micro-Optical Sensor for Electric Field Detection”, U.S. Patent No. 8,718,416 (2014)
2. “Whispering Gallery Mode based Seismometer”, U.S. Patent No. 8,743,372 (2014)

Invited Talk

1. **T. Ioppolo**, “Microscale whispering gallery mode lasers for sensing applications” SPIE Photonics West conference, 28-2 February 2017, San Francisco, California.
2. U. Ayaz, **T. Ioppolo** and M. V. Ötügen, “Measurement of wall shear stress in a planar backward-facing step flow using a micro-optical sensor” AIAA SciTech, January 13-17 2014, National Harbor, Maryland.
3. **T. Ioppolo**, “Polymeric microscale lasers: Fundamentals and applications”, 246th ACS National Meeting, September 8-12 2013, Indianapolis, Indiana.
4. V. Ötügen, **T. Ioppolo**, “Photonic Based Sensor for Fluid Dynamics Applications”, 48th AIAA Aerospace Sciences Meeting and Exhibit, Orlando, Florida 2010.
5. **T. Ioppolo**, Ulas K. Ayaz, V. Ötügen, “Force Sensors Based on the Whispering Gallery Modes of Dielectric Microspheres”, SPIE Photonics West conference, 24-29 January 2009, San Jose, California.
6. V. Ötügen, **T. Ioppolo**, “Whispering Gallery Mode Micro-Optical Sensors: New Opportunities for Developing Smart Composite Materials”, Materials Science & Technology 2008 Conference & Exhibition October 5-9, 2008 Pittsburgh, Pennsylvania.

Publications

Published Journal Articles:

1. E. Rubbino, T. Ioppolo, “Dynamical behavior of magnetostrictive spherical photonic resonators. Submitted to journal of applied Physics
2. E. Rubbino, T. Ioppolo, “Electrostrictive optical resonators for non-contact displacement measurement”, *Appl. Opt.* 56 (2), 229-233 2016.
3. E. Rubbino, **T. Ioppolo**, “Young’s Modulus and Loss Tangent Measurement of Polydimethylsiloxane Using an Optical Lever”, Journal of Polymer Science Part B: Polymer Physics, December 2015 doi: 10.1002/polb.23972
4. A. Zamanian, **T. Ioppolo**, “Effect of wall pressure and shear stress on embedded cylindrical microlasers”, *Appl Opt.* 2015 Aug 10;54(23):7124-30. doi: 10.1364/AO.54.007124
5. M. Manzo, **T. Ioppolo**, “Untethered photonic sensor for wall pressure measurement”, *Opt. Lett.* 2015 May 15; 40 (10):2257-60. doi: 10.1364/OL.40.002257
6. A. R. Ali, V. Ötügen, and **T. Ioppolo**, “High data rate transient sensing using dielectric micro-resonator”, *Appl. Opt.* 54(23), 7076-7081 (2015)
7. **T. Ioppolo**, M. Manzo, “Dome shaped micro-laser encapsulated in a flexible film”, Laser Physics, Vol. 24, N. 11 (2014)

8. **T. Ioppolo**, M. Manzo, "Dome shaped whispering gallery mode laser for remote wall temperature sensing", Applied Optics (2014)
9. A. Ali, **T. Ioppolo**, "Effect of Angular Velocity on Sensors Based on Morphology Dependent Resonances", Sensors, 14(4), 7041-7048 (2014)
10. **T. Ioppolo**, E. Rubbino, "Magnetic field induced morphology dependent resonances of a coupled composite Metglas slab with a polymeric optical resonator", Journal of Polymer Science Part B: Polymer Physics, 52(3), 272-275 (2014)
11. A. Ali, **T. Ioppolo**, V. Ötügen, M. Christensen, D. MacFarlane, "Photonic electric field sensor based on polymeric micro-spheres", Journal of Polymer Science Part B: Polymer Physics, DOI: 10.1002/polb.23429 (2013)
12. U. Ayaz, **T. Ioppolo** and M. V. Ötügen, "Direct measurement of wall shear stress in a separating and reattaching flow with a photonic sensor", Meas. Sci. Technol. 24, 124001-124010, (2013).
13. **T. Ioppolo**, V. Ötügen, U. Ayaz, "Development of Whispering Gallery Mode Polymeric Micro-optical Electric Field Sensors", J. Vis. Exp. , 71, e50199, doi:10.3791/50199 (2013).
14. **T. Ioppolo**, J. Stubblefield, M. V. Ötügen, "Electric field-induced deformation of polydimethylsiloxane polymers", J. Appl. Phys., 112, 044906 (2012).
15. M. Manzo, **T. Ioppolo**, U. K. Ayaz, V. LaPenna, M. V. Ötügen, "A photonic wall pressure sensor for fluid mechanics applications", Rev. Sci. Instrum. 83, 105003 (2012).
16. U. K. Ayaz, **T. Ioppolo**, V. Ötügen, "Wall shear stress sensor based on the optical resonances of dielectric microspheres", Meas. Sci. Technol. vol.22, 075203 (2011).
17. **T. Ioppolo**, V. Ötügen, "Effect of acceleration on the morphology dependent optical resonances of spherical resonators", J. Opt. Soc. Am. B, vol. 28, pp. 225-227 (2011)
18. **T. Ioppolo**, V. Ötügen, "Magneto-rheological Polydimethylsiloxane Micro-optical Resonator", Optics Letters, vol. 35, no. 12, pp. 2037-2039 (2010).
19. **T. Ioppolo**, N. Das and M.V. Ötügen, "Whispering gallery modes of microspheres in the presence of a changing surrounding medium: A new ray-tracing analysis and sensor experiment", J. Appl. Phys, vol. 107, 103105 (2010)
20. **T. Ioppolo**, M.V. Ötügen and K. Marcis, "Magnetic Field-Induced Excitation and Optical Detection of Mechanical Modes of Micro-Spheres", J. Appl. Phys, vol. 107, 123115 (2010)
21. V.P. Stepaniuk, **T. Ioppolo**, V. Ötügen, V. Sheverev, "Attenuation of Single-Tone Ultrasound by an Atmospheric Glow Discharge Plasma Barrier", J. Appl. Phys, vol. 108, 053301 (2010)
22. **T. Ioppolo**, U. K. Ayaz, V. Ötügen, "Tuning of Whispering Gallery Modes of Spherical Resonators Using an External Electric Field", Optics Express, vol. 17, 19, pp. 16465-16479 (2009)
23. **T. Ioppolo**, U. K. Ayaz, V. Ötügen, "High-Resolution Force Sensor Based on Morphology Dependent Optical Resonances of Polymeric Spheres", J. Applied Physics 105 ,1, (2009)
24. **T. Ioppolo**, M. Kozhevnikov, P. Stepaniuk, V. Ötügen and V. A. Sheverev, "A Micro-Optical Force Sensor Concept Based on Whispering Gallery Mode Resonator", Applied Optics 47 3009 (2008)
25. N.Quang, N. Gupta, **T. Ioppolo**, M. V. Ötügen, "Whispering Gallery Mode-Based Micro-Optical Sensors for Structural Health Monitoring of Composite Materials", Journal of Material Science DOI: 10.1007/s10853-008-3163-3
26. **T. Ioppolo**, M. V. Ötügen, "Pressure Tuning of Whispering Gallery Mode Resonators", J. Opt. Soc. Am. B, 10, 2721-2726, (2007)

27. P. Stepaniuk, **T. Ioppolo**, M. V. Ötügen, V. A. Sheverev, "Measurement of Gas Temperature and Convection Velocity Profiles in a DC Atmospheric Glow Discharge", *J. Applied Physics*, 102, (2007)
28. P. Benetti, A. Borio di Tigliole, E. Calligarich, A. Cesana, R. Dolfini, **T. Ioppolo**, G.L. Raselli, M.Terrani, "Non-Destructive Diagnostics of Thin Fissile Layers", *Nuclear Instruments and Methods in Physics Research A* 505 564-567, (2003)
29. P. Benetti, A. Borio di Tigliole, E. Calligarich, A. Cesana, R. Dolfini, **T. Ioppolo**, G.L. Raselli, M.Terrani, "Measurement of Fission Fragments Energy Loss", *Nuclear Instruments and Methods in Physics Research A* 491 272-279, (2002).

Refereed Conference Proceedings:

1. E. Rubino, **T. Ioppolo**, "Design fabrication and performances of a closed circuit subsonic wind tunnel", AIAA SciTech, January 9-13 2017, Grapevine, Texas
2. E. Rubino, **T. Ioppolo**, "Non-contact photonic displacement sensor based on the morphology dependent resonances", AIAA SciTech, January 9-13 2017, Grapevine, Texas
3. A. Zamanian, **T. Ioppolo**, "Effect of wall pressure and shear stress on embedded cylindrical microlasers", AIAA SciTech, January 13-17 2014, Kissme, Florida
4. M. Manzo, **T. Ioppolo**, "Micro-scale Untethered Sensor for Temperature Measurements", AIAA SciTech, January 13-17 2014, National Harbor, Maryland.
5. M. Manzo, **T. Ioppolo**, "Analysis of an Untethered Micro-Photonic Wall Pressure Sensor", AIAA SciTech, January 13-17 2014, National Harbor, Maryland.
6. **T. Ioppolo**, V. Ötügen, "Multi-layer resonators for optimized electric field sensitivity", SPIE Photonics West conference, 1-6 February 2014, San Francisco, California
7. **T. Ioppolo**, E. Rubbino, "Quasi-static high-resolution magnetic-field detection based on dielectric optical resonators". SPIE Defence Security and Sensing, Baltimore, Maryland 2013
8. **T. Ioppolo**, E. Rubbino, "Room-temperature micro-photonic bolometer based on dielectric optical resonators ". SPIE Defence Security and Sensing, Baltimore, Maryland 2013
9. **T. Ioppolo**, M. Manzo, P. Krueger, "A novel polymeric sheet with embedded micro optical resonant cavities for wall pressure measurements", 51th AIAA Aerospace Sciences Meeting and Exhibit, Grapevine , Texas 2013.
10. Amir Ali, **T. Ioppolo**, V. Otügen, "Beam-coupled micro-sphere optical resonator for high-resolution electric field detection", SPIE Photonics West conference, 2-7 February 2013, San Francisco, California.
11. J. Stubblefield, D. Womack, **T. Ioppolo**, U. Ayaz, V. Ötügen, "Composite micro-sphere optical resonators for electric field measurement", SPIE Photonics West conference, 23-28 January 2012, San Francisco, California
12. A. Amir, **T. Ioppolo**, V. Ötügen, " High-resolution electric field sensor based on whispering gallery modes of a beam-coupled dielectric resonator", Engineering and Technology (ICET), 2012 International Conference on , vol., no., pp.1,6, 10-11 Oct. 2012, Cairo
13. M. Manzo, **T. Ioppolo**, V. LaPenna, U. Ayaz, V. Ötügen, "Demonstration of a Novel Micro-Photonic Wall Pressure Sensor ", 50th AIAA Aerospace Sciences Meeting and Exhibit, Nashville, Tennessee 2012

14. U. K. Ayaz, **T. Ioppolo**, V. Ötügen, “High Resolution Micro-Optical Wall Shear Stress Sensor”, 49th AIAA Aerospace Sciences Meeting and Exhibit, Orlando, Florida 2011
15. **T. Ioppolo**, U. K. Ayaz, V. Ötügen, “Tuning of Whispering Gallery Modes of Polymeric Micro-Spheres and Shells Using External Electric Field”, SPIE Photonics West conference, 23-28 January 2010, San Francisco, California.
16. **T. Ioppolo**, U. K. Ayaz, V. Ötügen, “Whispering Gallery Mode Based Micro-Optical Sensor for Electromagnetic Field Detection”, AIAA InfoTech Aerospace Conference and Exhibit, April 2009, Seattle, Washington
17. **T. Ioppolo**, U. K. Ayaz, V. Ötügen, “Performance of a Micro-Optical Wall Shear Stress Sensor Based on Whispering Gallery Mode Resonators”, 47th AIAA Aerospace Sciences Meeting and Exhibit, Orlando, Florida AIAA-2009-0314
18. **T. Ioppolo**, U. K. Ayaz, V. Ötügen, “High-Resolution Whispering Gallery Mode Force Micro-Sensor Based on Polymeric Spheres”, 47th AIAA Aerospace Sciences Meeting and Exhibit, Orlando, Florida AIAA-2009-0314
19. **T. Ioppolo**, U. K. Ayaz, V. Ötügen and V. A. Sheverev, “A Micro-Optical Wall Shear Stress Sensor Concept Based on Whispering Gallery Mode Resonators”, 46th AIAA Aerospace Sciences Meeting and Exhibit, January 2008, Reno, Nevada
20. **T. Ioppolo**, M. Kozhevnikov, M. V. Ötügen, V. Sheverev, “Performance of a Whispering Gallery Mode Resonator-Based Micro-Optical Force Sensor”, 45th AIAA Aerospace Sciences Meeting and Exhibit, 8-11 January 2007 Reno, Nevada
21. N. Das, **T. Ioppolo**, M. V. Ötügen, “Investigation of a Micro-Optical Species Concentration Sensor Concept Based on Whispering Galley Mode Resonators”, 45th AIAA Aerospace Sciences Meeting and Exhibit, 8-11 January 2007 Reno, Nevada
22. **T. Ioppolo**, V. Ötügen, M. Kozhevnikov, V. Sheverev, “Sensor Technology Based on Fiber-Coupled Micro-Optical Resonators”, 5th Global Congress on Engineering Education, 17- 21 July 2006 Polytechnic Institute of NYU, New York
23. M. Kozhevnikov, **T. Ioppolo**, M. V. Ötügen, V. Sheverev, “Optical Force Sensor Based on Whispering Gallery Mode Resonators”, 44th Aerospace Sciences Meeting and Exhibit, 9-12 January 2006 Reno, Nevada

Bulletin of American Physical Society, Division of Fluid Dynamics Abstracts:

1. P. Rostami, **T. Ioppolo**, “Turbulent boundary layer over flexible plates”, 69th Annual Meeting of the APS Division of Fluid Dynamics, Number 22, 2016
2. **T. Ioppolo**, M. Manzo, “Dye doped micro-droplets as a sensor for fluid dynamics applications”, 68th Annual Meeting of the APS Division of Fluid Dynamics, Volume 57, Number 17, 2015
3. **T. Ioppolo**, M. Manzo, P. Krueger, “Performance of an untethered micro-optical pressure sensor”, 65th Annual Meeting of the APS Division of Fluid Dynamics, Volume 57, Number 17, 2012
4. U. K. Ayaz, **T. Ioppolo**, V. Ötügen, “Direct measurement of wall shear stress in a backward facing step flow by using a photonic wall shear stress sensor”, 65th Annual Meeting of the APS Division of Fluid Dynamics, Volume 57, Number 17, 2012
5. U. K. Ayaz, **T. Ioppolo**, V. Ötügen, “High Resolution Micro-Optical Wall Shear Stress Sensor Based on Whispering Gallery Modes of Dielectric Microspheres”, American Physical Society Meeting, Volume 56, Number 1, 2011
6. U. K. Ayaz, **T. Ioppolo**, V. Ötügen, “Performance of a Photonic Wall Shear Stress Sensor”, 62nd Annual Meeting of the APS Division of Fluid Dynamics, Volume 54, Number 19, 2009

7. **T. Ioppolo**, U. K. Ayaz, V. Ötügen , *“Demonstration of a Novel Micro-Optical Wall Pressure Sensor Concept Based on Whispering Gallery Mode Resonators”*, 61st Annual Meeting of the APS Division of Fluid Dynamics, Volume 53, Number 15, 2008
8. U. K. Ayaz, **T. Ioppolo**, V. Ötügen, *“Unsteady Wall Shear Stress Measurements Using a Polymeric Microsphere-Based Optical Sensor”*, 61st Annual Meeting of the APS Division of Fluid Dynamics, Volume 53, Number 15, 2008