



Work Experience

September 2018 – January 2020

DIEF – Industrial Engineering Department, University of Florence, Via di S. Marta, 3 - 50139 Firenze

Post-doctoral fellow

- Collaboration in the research activities of the Project “Tecnologie al plasma per l'industria del lusso: una manifattura innovativa nel comparto accessori in ottica 4.0” - “THIN FASHION”, CUP D55F1700024000
- Preparation of thin film deposits of metal and alloys for fashion application by magnetron sputtering
- Corrosion resistance and metallographic characterization of the deposits (XPS, EDX, SEM, XRD)

The aim of this work is to realize metal and alloys deposits application magnetron sputtering with high corrosion resistance and wear resistance that could be used to replace standard galvanic deposits in fashion application. During this collaboration I've realized thin film deposits of metal, alloys, ceramics and also multilayered materials and performed the characterization by XPS, EDX, SEM, FESEM and XRD. Moreover corrosion and wear resistance measurements are on going. Another focus of the project is to realize thin film deposits with a high control on the resulting color in order to obtain “gold-like” colorations without the use of precious metals.

Instrumental techniques and tools: Magnetron sputtering, SEM, corrosion techniques, XRD, XPS, FESEM, FIB

Institution: University of Florence, Via di S. Marta, 3 - 50139 Firenze

Grant detail: Research grant, Prot. N. 134259 from 01/09/2018 to 30/08/2019

Referent: Prof. Emanuele Galvanetto

January 2018 – August 2018

MUSAM – Multi Scale Analysis of Materials Research Unit, IMT School for Advanced Studies, Lucca

Postdoctoral Fellow

- Collaboration in the research activities of the ERC Starting Grant CA2PVM n° 306622 CUP E11j1200145006 “Multi-field and multi-scale Computational Approach to design and durability of Photovoltaic Modules”
- Responsible for the experimental activity of the MUSAM laboratory
- Electroluminescence and infrared testing of flexible photovoltaic modules after mechanical testing (fatigue degradation)
- Delamination tests of thin silicon films performed with tensile stage inside the SEM chamber
- Electron microscope analysis on functionalized graphene additives for paints

During this work I've prepared and tested several flexible photovoltaic modules with superior crack resistance, I've performed fatigue tests on them and experimental electroluminescence tests to assess the improvement on the performances. Moreover I've been responsible for the external activities of the MUSAM-lab. I've also performed SEM analysis on functionalized graphene nanoparticles to be used as additives for paints with improved UV resistance.

Instrumental techniques and tools: SEM, confocal profilometer, standard mechanical testing machine, thermal chamber, electroluminescence, infrared camera

Institution: IMT School for Advanced Studies Lucca, Multi-scale Analysis of Materials, Piazza San Francesco, 19, 55100 Lucca (LU).

Grant detail: Research grant, Prot. N. 06923.VII.16.27.12.17 from 01/01/2018 to 30/08/2018

Referent: Prof. Dr. Ing. Marco Paggi

December 2017

MUSAM – Multi Scale Analysis of Materials Research Unit, IMT School for Advanced Studies, Lucca

Visiting Scholar

- Mechanical testing of materials (mostly brittle materials and polymers)
- Profilometric measurements

During this collaboration I've performed several profilometric measurements to assess a new rough surface open database to be used by material scientist ad input for tribological and mechanical models.

Instrumental techniques and tools: SEM, confocal profilometer, standard mechanical testing machine, thermal chamber, electroluminescence, infrared camera

Institution: IMT School for Advanced Studies Lucca, Multi-scale Analysis of Materials, Piazza San Francesco, 19, 55100 Lucca (LU).

Grant detail: Prot. N. 06234.VII.16.01.12.17

Referent: Prof. Dr. Ing. Marco Paggi

November 2015 – November 2017

MUSAM – Multi Scale Analysis of Materials Research Unit, IMT School for Advanced Studies, Lucca

Postdoctoral Fellow

- Collaboration in the research activities of the ERC Starting Grant CA2PVM n° 306622 CUP E11j1200145006 "Multi-field and multi-scale Computational Approach to design and durability of Photovoltaic Modules"
- Responsible for the experimental activity of the MUSAM laboratory
- Electroluminescence and infrared testing of flexible photovoltaic modules after mechanical testing (fatigue degradation)
- Delamination tests of thin silicon films performed with tensile stage inside the SEM chamber
- Tensile tests of polymer backsheets of flexible PV modules (at room temperature and in climatic chamber)
- Compression tests on SiC foam to be used as scaffold for cell growth

My work has been focused on the experimental testing of brittle and ductile materials, like polymers and silicon, used in the production of PV modules, using multi-scale experimental methods to evaluate the damage induced on the various components of solar cells by mechanical testing (for example bending tests) that simulate real working conditions of the PV modules. Moreover, as responsible for the experimental activities of the research group, I've performed various mechanical testing for external industries.

Instrumental techniques and tools: SEM, confocal profilometer, standard mechanical testing machine, thermal chamber, electroluminescence, infrared camera

Institution: IMT School for Advanced Studies Lucca, Multi-scale Analysis of Materials, Piazza San Francesco, 19, 55100 Lucca (LU).

Grant detail: Research grant, Prot. N. 03571.VII.16.30.10.15 from 01/11/2015 to 30/11/2017

Referent: Prof. Dr. Ing. Marco Paggi

February 2014 – October 2015

MUSAM – Multi Scale Analysis of Materials Research Unit, IMT School for Advanced Studies, Lucca

Research Collaborator

- Collaboration in the research activities of the ERC Starting Grant CA2PVM n° 306622 CUP E11j1200145006 "Multi-field and multi-scale Computational Approach to design and durability of Photovoltaic Modules"
- Responsible for the experimental activity of the MUSAM laboratory
- Standard mechanical testing, mechanical testing in climatic chamber and in the scanning electron microscope
- Roughness analysis with confocal profilometer
- Contact simulations with boundary element method
- Development of a software for the statistical and fractal analysis of rough surfaces
- Digital image correlation techniques on SEM images during delamination tests to evaluate the adhesion of paper layers

I've developed a MATLAB software to perform the statistical analysis of real rough surfaces, scanned with a confocal profilometer, and numerical generated surfaces (with random midpoint displacement method, RMD, and spectral synthesis method, SSM) to assess the reliability of fractal modeling and random process theory (RPT) on the description of naturally and artificially textured surfaces. Moreover, I have performed contact simulations with the boundary element method of generated and real bifractal surfaces that demonstrated that the

RPT and the fractal description are not sufficient to describe the behavior of real textured surfaces. As responsible for the experimental activities of the laboratory, I have also performed various tests for external industries.

Instrumental techniques and tools: SEM, confocal profilometer, standard mechanical testing machine, thermal chamber, electroluminescence, infrared camera

Institution: IMT School for Advanced Studies Lucca, Multi-scale Analysis of Materials, Piazza San Francesco, 19, 55100 Lucca (LU).

Grant detail: Research grant, Prot. N. 00474.VII.16.12.02.14 from 3/2/2014 to 2/2/2015; Research grant, Prot. N. 00217.VII.16.23.01.15 from 3/2/2015 to 30/10/2015

Referent: Prof. Dr. Ing. Marco Paggi

March 2013 – December 2013

INSTM, Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali - Via G. Giusti 9, 50121 Florence

Term contract Researcher

- Collaboration in the research activities of the Project Greenmetal “Sviluppo di leghe metalliche innovative destinate al settore degli accessori moda” funded under RT – Bando Unico 2012
- Development of new molding and casting alloys for fashion applications based on copper and low melting point metals
- Corrosion resistance and metallographic characterization of the alloys. (XRF, EDX, SEM, impedance spectroscopy, Vickers hardness and indentation tests)

The aim of the project was the development of new molding and casting alloys for fashion applications based on copper and low melting point metals, to avoid the use of toxic metals. In the first part of the work, I evaluated the effect of the presence of every metal in the physical and mechanical properties of the alloys (brass and bronze) and I proposed various formulations for new alloys based on the desired characteristics (low price, high corrosion resistance, good machinability, etc). On the second part of the research, my work was focused on the analysis of the proposed alloys to verify mechanical and chemical properties, like hardness, corrosion resistance, and composition.

Instrumental techniques and tools: XRF, SEM-EDX, optical microscope, Vickers microindenter, EIS

Institution: INSTM, Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali - Via G. Giusti 9, 50121 Florence.

Grant detail: Term contract researcher. Part-time collaboration from 11/03/2013 to 10/09/2013 and full time collaboration from 11/09/2013 to 31/12/2013

Referent: Prof. Ugo Bardi

April 2011 – July 2011

INSTM, Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali - Via G. Giusti 9, 50121 Florence

Term contract Researcher

- Collaboration in the research activities of the FIRB project N° RBIP06X7F4: “Morphological, compositional, microstructural characterization and isothermal oxidation tests on CoNiCrAlY coatings realized by VPS on Ni-based superalloy, with different surface finishing”
- Morphological and compositional analysis on Al-Si deposits for gas turbines

The collaboration was aimed to assess the effect of various parameters, like the dimension of the silicon particles in the bath, on the morphology of the obtained deposits. The deposits were obtained in a glove box from a ionic liquid galvanic bath (1:2 BmimCl:AlCl₃) with the presence of silicon particles of 325 mesh in the quantity of 1g/L. The used substrate were CoNiCrAlY coated steel parts of gas turbine; the reduction of aluminum was studied performing different cyclic voltammetry experiments at different speeds and the deposits were then analyzed by SEM-EDX to verify the presence of silicon particles.

Instrumental techniques and tools: cyclic voltammetry, glove box, SEM-EDX

Institution: INSTM, Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali - Via G. Giusti 9, 50121 Florence.

Grant detail: Term contract researcher. From 01/04/2011 to 31/07/2011

Referent: Prof. Ugo Bardi

July 2010 – December 2010

I²T³ Onlus (I.I.T.T. - Innovazione Industriale Tramite Trasferimento Tecnologico), Viale Morgagni 67/A, 50134 Florence

Term contract Researcher

- Collaboration in the research activities of the V2 project: “Tecniche di separazione con solventi chelanti per estrazione di metalli, in particolare Vanadio per applicazioni in batterie REDOX, stoccaggio elettrochimico di energia elettrica”
- Development of a new method to recover Vanadium (IV) from spent catalysts from petrochemical industry for application in vanadium batteries

In this work I've developed an experimental methodology to recover V(IV) from spent catalyst. The first part of the project was aimed to evaluate the best conditions for the extraction of vanadium from spent catalysts, while in the second part, the objective was to separate vanadium from other metals present in the obtained solutions by ion-exchange resins. I've performed different tests with different solvent extraction reagents containing chelating agents and separations of the extracts with different ion exchanging resins to evaluate the best conditions for the extraction (pH, time, concentration), as well as ICP-AES analysis of the resulting solutions.

Instrumental techniques and tools: Solvent extraction, ion exchange column separation of the extracts and chemical analysis of the recovered metal solutions (ICP-AES and chromatography).

Institution: I²T³ Onlus (I.I.T.T.T. - Innovazione Industriale Tramite Trasferimento Tecnologico), Viale Morgagni 67/A, 50134 Florence. Note that the institution has been closed and now all the information about past contracts are handled by: Fondazione per la Ricerca e l'Innovazione promossa dall'Università di Firenze e la Città Metropolitana di Firenze, Piazza S. Marco, 4, 50121 Florence, Tel: + 39 0554574631 - 0554574647 – 0554574622 Fax: + 39 055 4574639, email: fondazionericerca@unifi.it

Grant detail: Term contract researcher. Prot. N. 859.2010 from 01/07/2010 to 31/12/2010

Referent: Prof. Ugo Bardi

April 2010 – July 2010

INSTM, Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali - Via G. Giusti 9, 50121 Florence

Term contract Researcher

- Collaboration in the research activities of the FIRB project N° RBIP06X7F4: “Morphological, compositional, microstructural characterization and isothermal oxidation tests on CoNiCrAlY coatings realized by VPS on Ni-based superalloy, with different surface finishing”
- Finite element analysis of thermal fatigue in thermal barrier coatings (TBC)

I've developed a finite element model to estimate the stresses induced by thermal cycling experiments on plasma sprayed thermal barrier coatings. I performed the heat transfer analysis to evaluate the temperature distribution on the specimen during the cooling under an impinging air jet, as well as the temperature measurements of the cooled samples with an infrared pyrometer. These results have been integrated in a structural mechanics model in COMSOL Multiphysics® as thermal load that was able to predict the effect of this kind of thermal experiments on the failure mechanisms of the TBC like spalling and delamination.

I also performed characterization of the TBC with impedance spectroscopy, oriented on the time evolution of the thermally grown oxide (TGO) layer in the TBC exposed to thermal oxidation experiments, in order to evaluate the resistance of the coatings.

Instrumental techniques and tools: EIS, SEM-EDX, COMSOL Multiphysics®, infrared pyrometer, optical microscope, muffle furnace.

Institution: INSTM, Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali - Via G. Giusti 9, 50121 Florence.

Grant detail: Term contract researcher. FIRB project N° RBIP06X7F4. From 19/04/2010 to 03/07/2010

Referent: Prof. Ugo Bardi

March 2009 – April 2010

INSTM, Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali - Via G. Giusti 9, 50121 Florence

Term contract Researcher

- Designing of a new experimental set up for silicon purification

During this collaboration, I've designed a new version of the experimental set up for silicon purification based on the results of the assessed analytical model developed during the Ph.D. The principal difference from the original experimental set-up was the elimination of the magneto-hydrodynamic pumps based on the evidence that the contribution to the purification due to the presence of a flux of the liquid metal inside the set up was negative, since it diminished the residence time of the material in the purification zone. I've also assessed a COMSOL Multiphysics® model to evaluate the joule heating of the liquid silicon due to the electric field present in the purification zone and prepared nickel and lead enriched samples to be processed and analyzed after the purification.

Instrumental techniques and tools: SEM-EDX, COMSOL Multiphysics®, infrared pyrometer, optical microscope.

Institution: INSTM, Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali - Via G. Giusti 9, 50121 Florence.

Grant detail: Term contract researcher. Industrial funding, from 31/03/2009 to 31/12/2009 and from 01/02/2010 to 18/04/2010
Referent: Prof. Ugo Bardi

March 2007 – March 2009

INSTM, Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali - Via G. Giusti 9, 50121 Florence

Term contract Collaboration

- Collaboration in the research activities of the European project IOLISURF – contract n. NMP3-CT-2006-517002 “Ionic liquids as a novel electrochemical medium for radically innovative, cost effective, and environmentally friendly surface treatment technologies” funded under FP6-NMP
- Aluminum deposition from non-aqueous solution (Ionic liquids). Evaluation of the effect of organic additives (like phenanthroline) on the deposit morphology
- Metallographic characterization of deposits
- Corrosion resistance testing of the deposits: salt spray tests, potentiodynamic polarization curves, open-circuit potential and electrochemical impedance spectroscopy
- Modeling of electrodeposition and cyclic voltammetry experiments with COMSOL Multiphysics® to assess the effect of geometry and conductivity of the galvanic cell

During this collaboration, I've realized aluminum deposits from ionic liquids on iron substrates. The effect of the type of ionic liquid, the current density and the presence of organic additives like 1,10-phenanthroline, was correlated to the different morphological, mechanical and chemical properties of the obtained deposits. The deposits were characterized with SEM-EDX, stylus profilometry, optical microscope and Vickers microhardness indenter, while the corrosion resistance properties were evaluated with salt spray tests and impedance spectroscopy measurements. Moreover, I've developed a COMSOL Multiphysics® model to simulate the effect of geometry and other physical parameters on the current densities during cyclic voltammetry experiments.

Instrumental techniques and tools: SEM-EDX, COMSOL Multiphysics®, potentiostat, optical microscope, contact stylus profilometer, Vickers microhardness indenter, glove box, salt spray chamber, EIS.

Institution: INSTM, Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali - Via G. Giusti 9, 50121 Florence.

Grant detail: Term contract researcher. European project IOLISURF – contract n. NMP3-CT-2006-517002 From 01/03/2007 to 31/12/2007; from 01/01/2008 to 31/12/2008 and from 01/01/2009 to 31/03/2009

Note: these collaborations were carried out in parallel with the research activities of the Ph.D.

Referent: Prof. Ugo Bardi

August 2006 – February 2007

INSTM, Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali - Via G. Giusti 9, 50121 Florence

Term contract Researcher

- Collaboration in the research activities of the European project AQUASOLIS - Innovative Applications of Solar Trough Concentration for Quality Fresh Water Production and Waste Water Treatment by Solar Distillation, project N. PL 026350 funded under FP6-INCO
- Review of the state of the art of water production processes through solar concentration. This activity was performed by means of an extensive literature search aimed at selecting the more promising processes and materials
- High porosity copper electrodeposition for thermal exchange applications and morphological and mechanical characterization of the deposits

Instrumental techniques and tools: SEM-EDX, potentiostat, optical microscope, contact stylus profilometer, Vickers microhardness indenter.

Institution: INSTM, Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali - Via G. Giusti 9, 50121 Florence.

Grant detail: Term contract researcher. European project AQUASOLIS project N. PL 026350, from 01/08/2006 to 28/02/2007

Referent: Prof. Ugo Bardi

Education

- **2nd level university master degree: Techniques and applications to scientific investigation.**
University of Florence, 2010-2011
Thesis title: “Blood pattern analysis at the crime scene”
Final Mark: 110/110 (magna cum laude)

During the final training at “Reparto investigazioni scientifiche” of Arma dei Carabinieri in Rome, I’ve performed experiments to assess the reliability of the analytical model used to determine the origin of impact and the direction of the blood stains from the dimension of the stains themselves. In particular, the work was focused on the statistically significant deviations of the evaluated impact angles of spattered horse blood on different substrates (like wood, cotton and paper) at different impact angles and different heights, from the effective impact angles. This work demonstrated that, in the presence of absorbing substrates, the evaluation of the impact angles with the standard analytical model could produce results that deviates significantly from the reality.

Institution and diploma detail: Biology department, Via del Proconsolo 12, 50122 Firenze. Diploma n. 004012, Thesis defense and date of issue: 31/05/2011

Referent: Magg. Paolo Fratini

▪ **Ph. D. in material science and engineering.**

University of Florence, 2007-2009

Ph.D student without grant, Thesis defense: 12/03/2010

Thesis title: “New materials and production methods for photovoltaic industry”

During the Ph.D., I have developed a new technique to purify semiconductors and metals with the use of the mass transport induced by the Lorentz force generated applying electric and magnetic perpendicular fields to the melted material. In fact, the presence of impurities, that have lower conductivity than the liquid metal, generates distortions in the force field that cause the migration of the particles and their separation from the liquid metal.

I developed three different mass transport theoretical and numerical (finite element) models (1, 2 and 3D) to explain the purification process and combined them with the results of the trace analysis on the samples after the experiments, performed by ICP-MS technique. These results allowed me to evaluate the effective volume of the impurity particle in the melted material, which is the volume where the distortions of the electromagnetic field’s lines occur. I also found that clusters with some nanometers radius occurs in the liquid indium for every kind of impurity I analyzed.

I assembled the purification set up in the laboratory and performed tests of purification that showed that this technique is capable of removing impurities even starting from a high purity material. In the second part of the project I designed and realized the experimental set up for the purification of silicon, based on the same process; since there are differences in the physical properties between silicon and indium (such as lower electrical conductivity and higher melting point), the experimental configuration was completely different. From the theoretical model, I have developed to explain the indium purification, I realized that the flowing of silicon had to be avoided, since it would include some more experimental difficulties and since the velocity of the fluid does not positively affect the purification process. Therefore, I designed the new experimental set up to melt silicon by joule heating, and to avoid the demagnetization of the permanent magnets due to high working temperature, I designed a refrigerating liquid system. At the end, this work demonstrated that the purification of metals and semiconductors is possible and efficient by mass transport in a crossed magnetic and electric field and that this method is simple to achieve in a small-scale laboratory set up and cheaper than the current purification techniques available.

Main Skills acquired:

- Finite Element Analysis;
- Mass transport phenomena (mechanisms, mathematical modeling);
- Chemical characterization (ICP-MS, SIMS, XPS);
- Material science laboratory;
- Sample handling and preparation;

Institution and diploma detail: Department of civil and environmental engineering (DICEA), Via di S. Marta, 3 50139 Firenze. Date of issue: 05/01/2011. *Note:* Ph.D. student without grant.

Referent: Prof. Ugo Bardi

▪ **Qualifying examination for the chemist profession**

University of Florence, Second Session 2006

Diploma detail: date of issue 20/10/2011

▪ **Master degree in Chemistry**

University of Florence, 2000-2006

Thesis defense: 26/04/2006

Thesis title: “Interaction of pyridine-dicarboxylate anions with macrocyclic polyamine receptors”

Final mark: 106/110

I studied the interaction of the biologically relevant anions deriving from the six pyridinedicarboxylic acids (H₂PDC) with two macrocyclic receptors containing a pentamine chain and a bipyridine or a phenanthroline moiety, as well as with the aliphatic analogue [21]aneN₇. I used spectroscopic methods (UV-vis, fluorescence and NMR) and potentiometric titrations to afford the stability constants of the formed adducts. This studies demonstrated that all three receptors form stable complexes with the substrates thanks to the formation of several salt bridges and hydrogen bond contacts, as observed in the crystal structure of the H₈[3(2,6-PDC)₄] · H₂O · 0.5EtOH solid compound that was obtained by X-ray diffraction. Additional π -stacking interactions between the aromatic moieties of substrates and receptors enhance the stability of complexes with the aromatic groups, which show a marked selectivity toward 2,6-pyridinedicarboxylate anions. In particular, the bipyridine ligand is able to perform a very efficient recognition of these species.

Main Skills acquired:

- Spectroscopic techniques (UV-vis, fluorescence, NMR);
- Potentiometric titration;
- Chemistry laboratory;
- X-ray diffraction;
- Supramolecular chemistry;

Institution and diploma detail: Chemistry department, Via della Lastruccia, 3, Sesto Fiorentino (FI). Diploma N. 014638, date of issue: 28/04/2006.

Referent: Prof. Antonio Bianchi

▪ **High school diploma**

Liceo Scientifico F. Redi, via Leone Leoni 38, 52100, Arezzo (AR)

Final mark: 100/100

Diploma N. 26016, date of issue: 14/07/2000

Other qualifications

▪ **Conservatory degree (French Horn)**

Istituto Superiore di Studi Musicali "L.Boccherini" – Piazza del Suffragio, 6 - 55100 Lucca

Date of issue: 05 July 2001.

Final mark: 8.0/10.0

▪ **JLPT (Japanese Language Proficiency test)**

Istituto Giapponese di Cultura – Via A. Gramsci 74, 00197 Rome.

December 2012 - Level N5

Total Mark: 92/180 (30/60 Listening, Grammar and vocabulary 62/120), Grammar B, Reading A, Vocabulary A

▪ **Cambridge ESOL English test**

PeopleCert Qualifications Ltd, UK company number 09620926

August 2020 - Level C1 (Expert)

Total Mark: High Pass (Speaking 38/50, Writing 34/50, Reading 50/50, Listening 50/50)

Scientific production

Papers in journals

- E. Berretti, N. Calisi, A. Capaccioli, C. Borri, L. Capozzoli, A. M. Hamouda, A. Giaccherini, W. Giurlani, A. Ienco, S. Martinuzzi, M. Innocenti, U. Waware, G. Zangari and A. Lavacchi, **“Electrodeposited White Bronzes: A Comparison between Zn-Bearing and Zn-Free Coatings”**, Mater. Proc. 2020, 2, 26
- C. Borri, N. Calisi, E. Galvanetto, N. Falsini, F. Biccari, A. Vinattieri, G. Cucinotta, S. Caporali, **“First proof-of-principle of inorganic lead halide perovskites deposition by magnetron-sputtering”**, Nanomaterials, 2020, 10, 60
- C. Borri, S. Caporali, F. Borgioli, E. Galvanetto, **“Nitrogen Rich Stainless Steel Coatings Obtained by RF Sputtering Process”**, Conference paper per “1st Coatings and Interfaces Web Conference” (CIWC 2019), online 15-29 Marzo 2019, DOI:10.3390/ciwc2019-06157

- V. Carollo, D. Piga, C. Borri, M. Paggi, **“Identification of elasto-plastic and nonlinear fracture mechanics parameters of silver-plated copper busbars for photovoltaics”**, Engineering Fracture Mechanics, *in press*, DOI:10.1016/j.engfracmech.2018.11.014
- C. Borri, M. Gagliardi and M. Paggi, **“Fatigue crack growth in Silicon solar cells and hysteretic behaviour of busbars”**, Solar Energy Materials and Solar Cells, 2018, 181, 21-29
- C. Casiraghi, M. Macucci, K.Parvez, R.Worsley, Y.Shin, F.Bronte, C.Borri, M.Paggi and G.Fiori, **“Inkjet printed 2D-crystal based strain gauges on paper”**, Carbon, 2018, 129, 462-467
- M. Gagliardi and C. Borri, **“Polymer Nanoparticles as Smart Carriers for the Enhanced Release of Therapeutic Agents to the CNS”**, Current Pharmaceutical Design, 2017, DOI: 10.2174/1381612822666161027111542
- C. Borri and M. Paggi, **“Topology simulation and contact mechanics of bifractal rough surfaces”**, Proceedings of the Institution of Mechanical Engineers Part J: Journal of Engineering Tribology, 2016, 230 (11) 1345-1358
- C. Borri, M. Paggi, J. Reinoso and Feodor M. Borodich, **“Adhesive behaviour of bonded paper layers: Mechanical testing and statistical modelling”**, Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science, 2016, 230(9) 1440-1448
- C. Borri and M. Paggi, **“Topological characterization of antireflective and hydrophobic rough surfaces: are random process theory and fractal modeling applicable?”**, Journal of physics D: Applied physics, 2015, 48, 045301
- A. Lavacchi, U. Bardi, C. Borri, M.Orfei and A. Tolstogousov, **“Separation of particles from suspensions using transverse force field: a mass transport analysis”**, Heat and Mass Transfer, 2010, 46, pp803–807
- M. Di Ferdinando, A. Fossati, A. Lavacchi, U. Bardi, F. Borgioli, C. Borri, C. Giolli, A. Scrivani, **“Isothermal oxidation resistance comparison between air plasmas sprayed,vacuum plasma sprayed and high velocity fuel sprayed CoNiCrAlY bond coats”**, Surface and Coatings Technology, 2010, 204, pp 2499-2503
- A. Lavacchi, U. Bardi, C. Borri, O. Trunina, E. Trunin, A. Tolstogousov, **“Purification of liquid indium by current induced impurity migration in a static transverse magnetic field”**, Scripta Materialia, 2009, 60, pp 423-426
- A. Lavacchi, U. Bardi, C. Borri, S.Caporali, A. Fossati, I. Perissi, **“Cyclic Voltammetry Simulation at Microelectrode Arrays with COMSOL Multiphysics®”**, Journal of Applied Electrochemistry, 2009, 39:2159-2163
- C. Bazzicalupi, A. Bencini, A. Bianchi, C. Borri, A. Danesi, E. Garcia-España, C. Giorgi, e B.Valtancoli, **“Polyfunctional recognition of pyridinedicarboxylate anions with macrocyclic polyamine receptors containing heteroaromatic groups”**, J. Org. Chem., 2008, 73 (21), pp 8286–8295

Conference proceedings and book contributions

- Falsini, N.; Borri, C.; Calisi, N.; Caporali, S.; Galvanetto, E.; Balestri, D.; Biccari, F.; Vinattieri, A.; **“A new route to large-area thin film deposition of inorganic perovskites: RF-Magnetron sputtering deposition of CsPbBr₃”**, oral presentation at **“ONS ‘19”, Optic at the Nanoscale conference**, Capri, 9-11 September 2019
- Falsini, N.; Borri, C.; Calisi, N.; Caporali, S.; Biccari, F.; Vinattieri, A.; **“Non-linear exciton dynamics in CsPbBr₃ nanometric thin films”**, oral presentation at **“ONS ‘19”, Optic at the Nanoscale conference**, Capri, 9-11 September 2019
- Caneschi, A.; Briganti, M.; Berretti, E.; Borri, C.; Capozzoli, L.; Cini, A.; Fantechi, E.; Giaccherini, A.; Innocenti, M.; Lavacchi, A.; **“Physical Vapor Deposition (PVD) vs electrochemical deposition; an analysis on the two processes by means of a chemical physical characterization of the thin films”**, poster at AIMAT, Ischia, 21-24 July 2019
- Galvanetto, E.; Calisi, N.; Borri, C.; Caporali, S.; Bacci, T.; Cini, A.; Borgioli, F.; **“Nitrogen-rich stainless steel thin films obtained by magnetron sputtering”**, poster at AIMAT, Ischia, 21-24 July 2019
- Caporali, S.; Borri, C.; Calisi, N.; Galvanetto, E.; Falsini, N.; Biccari, F.; Vinattieri, A.; **“Caesium Lead Bromide deposition via RF-Magnetron sputtering: a novel approach to inorganic perovskites thin films”**, oral presentation at AIMAT, Ischia, 21-24 July 2019
- Berardone, I.; Borri, C.; Carollo, V.; Cinat, P.; Corrado, M.; Gagliardi, M.; Lenarda, P.; Paggi, M.; Reinoso, J.; Ruiz Baier, R.; **“Computational mechanics research at IMT”**, Poster for IMT Day, Lucca 10-11 July 2018

- Dardano N.; Borri C.; Paggi M; “A mechanical model for the peeling of a busbar from a solar cell”, ESMC 2018 10th European Solid Mechanics Conference, Bologna, 2-6 Luglio 2018
- Fiscaro P.; Valvo P. S.; Borri C.; “Evaluation of the elastic stiffnesses of multi-directional laminates by bending tests”, Poster ESMC 2018 10th European Solid Mechanics Conference, Bologna, 2-6 Luglio 2018
- Berardone, I.; Borri, C.; Carollo, V.; Cinat, P.; Corrado, M.; Gagliardi, M.; Lenarda, P.; Paggi, M.; Reinoso, J.; Ruiz Baier, R.; “La ricerca in meccanica computazionale alla scuola IMT: obiettivi, risultati, sfide”, Poster for BrighT Toscana – La notte dei Ricercatori, 29 Settembre 2017 (IMT – Scuola alti studi, Lucca)
- Cinat, P.; Borri, C.; Paggi, M.; “Surface roughness genomics”, International Conference on Computational Contact Mechanics, 5-7 July 2017 Lecce (Italy)
- Berardone, I.; Borri, C.; Carollo, V.; Cinat, P.; Corrado, M.; Gagliardi, M.; Lenarda, P.; Paggi, M.; Reinoso, J.; Ruiz Baier, R.; “La ricerca in meccanica computazionale alla scuola IMT: obiettivi, risultati, sfide”, Poster for BrighT Toscana – La notte dei Ricercatori, 29 September 2017 (IMT – Scuola alti studi, Lucca).
- Berardone, I.; Borri, C.; Paggi, M.; Hensen, J.; Kajari Schroeder, S.; “Materiali innovativi per applicazioni alle energie rinnovabili”, Poster for BrighT Toscana – La notte dei Ricercatori, 30 September 2016 (IMT – Scuola alti studi, Lucca).
- Carollo, V.; Paggi, M.; Borri, C.; “A two-scale constitutive parameters identification procedure for coupled elastoplastic fracture and fatigue”, 21st European Conference on Fracture, 20-24 June 2016, Catania (Italy).
- “GIMC-GMA 2016 XXI convegno italiano di meccanica computazionale e VIII riunione del gruppo materiali AIMETA Atti del convegno a cura di: Paggi, M.; Bacigalupo, A.; Bennati, S.; Borri, C.; Corrado, M.; Gizzi, A.; Valvo P.S.” (2016). (Eds.) ISBN 979-12-200-1333-8.
- Cinat, P.; Paggi, M.; Borri, C.; (2016) “Percolation proprieties of the free volume generated by two rough surfaces in contact below the full contact limit” Proceedings of the ECCOMAS conference 2016, (Crete), Conference paper, doi: 10.7712/100016.1923.8176
- Paggi, M.; Borri, C.; Reinoso, J.; “Pannelli solari, carta e adesivi: cosa hanno in comune? Ce lo spiega la meccanica” Poster for BrighT Toscana – La notte dei Ricercatori, 25 September 2015 (IMT – Scuola alti studi, Lucca).
- Carollo, V.; Borri, C.; Paggi, M.; (2015). A two-scale constitutive parameters identification procedure for elasto-plastic fracture. A: COMPLAS XIII. “COMPLAS XIII: proceedings of the XIII International Conference on Computational Plasticity: fundamentals and applications”. Ed. Barcelona: CIMNE, p. 922-931. ISBN: 978-84-944244-6-5
- Borri, C.; Fossati, A.; Lavacchi, A.; Bacci, T.; Bardi, U.; (2012). Simulazione agli elementi finiti e controllo termografico del raffreddamento di una barriera termica per mezzo di un getto d’aria forzata. In: XI Convegno Nazionale AIMAT, Gaeta (LT), 16-19 Settembre 2012, Edizioni Eva di R. Iannacone, pp. 61-64, ISBN: 9788897930037
- Bardi, U.; Borri, C.; Giolli, C.; Giorgetti, A.; Meneghetti, S.; Nocivelli, J.; Scrivani, A.; (2011). Net energy return (EROEI) of Thermal Barrier Coatings in turbine engines, Thermal Spray 2011: Proceedings of the International Thermal Spray Conference (DVS-ASM) (Hamburg)
- Lavacchi, A.; Bardi, U.; Borri, C.; Perissi, I.; (2009). Toward the Exploitation of the Ionic Liquids Based Electrochemical Technologies: Mass Transport Issues, 216th ECS Meeting-The Electrochemistry Society MA2009-02 3080 (Wien)
- Perissi, I.; Borri, C.; Lavacchi, A.; Caporali, S.; (2009) Current Density Simulations in the Electrodeposition from Ionic Liquids: Effects of the Conductivity, Proceedings of the COMSOL Conference 2009 (Milan)
- Borri, C.; Lavacchi, A.; Fossati, A.; Perissi, I.; Bardi, U.; (2009) Finite element analysis of thermal fatigue in thermal barrier coatings (TBC), Proceedings of the COMSOL Conference 2009 (Milan)
- Bardi, U.; Borri, C.; Caporali, S.; Lavacchi, A.; (2008) Toward the Exploitation of the Ionic Liquids Based Electrochemical Technologies: a Simulation Approach, GEI-ERA 2008 Giornate dell’Elettrochimica Italiana – Elettrochimica per il Recupero Ambientale (Genova)

Oral presentations

- “1st Coatings and Interfaces Web Conference” (CIWC 2019): “**Nitrogen Rich stainless Steel Coatings Obtained by RF Sputtering Process**”; Online conference, March 2019.
- “Materials 2018” (Trade fair and conference): R2B meetings , 30-31 May 2018, Eindhoven (NL).
- Congress participation “PVTC2017 (Photovoltaic technical conference)” with the oral contribution: “**Evolution of fatigue damage in flexible photovoltaic modules**”; Marseille 2017.
- Research to Business at Toscana Technologica, Elevator pitch: “Modelli numerici predittivi per l’adesione del paper tissue”, 27 February 2017, Florence.
- Congress participation “42nd Leeds-Lyon Symposium on tribology” with the oral contribution: “**Topology simulation and contact mechanics of bifractal rough surfaces**”; Lyon 2015.

- Congress participation “*Euromech colloquium 575*” with oral contribution “**Multiscale characterization of complex surfaces: anti-reflective coatings, hydrophobic surfaces and fibrillar interfaces**”; Lucca 2015.
- Congress participation “*EMMC14*” with the oral contribution: “**Statistical description and fractal properties of nominally flat surfaces: comparison between numerically generated and real rough surfaces**”; Gotheborg 2014.
- Congress participation “*International thermal spray conference 2011*” with oral contribution: “**Net energy return (EROEI) of Thermal Barrier Coatings in turbine engines**”; Hamburg 2011.
- Congress participation “*COMSOL European Conference 2009*” with oral contribution: “**Finite Elements Analysis of Thermal Fatigue in Thermal Barrier Coatings (TBC)**”; Milan 2009.
- Congress participation “*GEI-ERA 2008*” with oral contribution: “**Cyclic Voltammetry Simulation at microelectrode arrays**”; Genova 2008.

Referee activity

- Green chemistry
- Microscopy and Microanalysis
- Journal of mechanical engineering science
- Tribology International
- American Journal of Engineering and Applied Sciences
- Canadian Journal of Physics

Participation to research projects and technical reports drafting

- THIN FASHION “Tecnologie al plasma per l’industria del lusso: una manifattura innovativa nel comparto accessori in ottica 4.0”, funded by Regione Toscana POR FESR 2014-2020, CUP D55F1700024000
- “GLYCOG-LAB 4.0”, “Nanoadditivo multiproprietà ad attività UV assorbente e preservante”, funded by Regione Toscana POR FESR 2014-2020, CUP D51B17002340009
- “Taglio in testa poliammide semilavorata” (Industrial project in collaboration with GEFE Polymers S.r.l., 2016)
- ERC Starting Grant CA2PVM n° 306622 CUP E11j1200145006 “Multi-field and multi-scale Computational Approach to design and durability of Photovoltaic Modules”
- RT – Bando Unico 2012 – Greenmetal “Sviluppo di leghe metalliche innovative destinate al settore degli accessori moda”
- FIRB project N° RBIP06X7F4: “Morphological, compositional, microstructural characterization and isothermal oxidation tests on CoNiCrAlY coatings realized by VPS on Ni-based superalloy, with different surface finishing”
- Industrial project “V2” “Tecniche di separazione con solventi chelanti per estrazione di metalli, in particolare Vanadio per applicazioni in batterie REDOX, stoccaggio elettrochimico di energia elettrica”
- European project IOLISURF – contract n. NMP3-CT-2006-517002 “Ionic liquids as a novel electrochemical medium for radically innovative, cost effective, and environmentally friendly surface treatment technologies” funded under FP6-NMP
- European project AQUASOLIS – Innovative Applications of Solar Trough Concentration for Quality Fresh Water Production and Waste Water Treatment by Solar Distillation, project N. PL 026350 funded under FP6-INCO

Teaching experience

- October 2011 – May 2012
High school teacher
ITIS T. Buzzi, Viale della Repubblica, 9 59100 Prato (PO)
High school chemistry teacher: inorganic chemistry, analytical chemistry, physical chemistry.
Contract details: Prot. N. 3859/C1b from 1/10/2011 to 15/10/2011, Prot. N. 4113/C1b from 18/10/2011 to 3/11/2011 and following extensions (to 12/12/2011: 4383/C1b, to 31/1/2012: 5198/C1b, to 1/3/2012: 543/C1b, to 5/4/2012: 1095/C1b, to 8/5/2012: 1670/C1b)
- September 2012 – June 2013
High school teacher
Istituto di istruzione superiore C. Livi, Via Antonio Marini, 9 59100 Prato (PO)
High school chemistry teacher: inorganic chemistry, organic chemistry, material chemistry (construction materials and textile materials).
Contract details: Prot. N. 2473C4 from 19/09/2012 to the nomination of the entitled, Prot. N. 3397C4 from 10/12/2012 to 30/06/2013

- September 2013 – June 2014
 High school teacher
 Istituto di istruzione superiore C. Livi, Via Antonio Marini, 9 59100 Prato (PO)
 High school chemistry teacher: organic chemistry, material chemistry (textile materials).
 Contract details: Prot. N. 2117 from 16/09/2013 to 30/06/2014
- September 2014 – June 2015
 High school teacher
 ITIS T. Buzzi Viale della Repubblica, 9 59100 Prato (PO)
 High school chemistry teacher: inorganic chemistry.
 Contract details: Prot. N. 4853, from 29/09/2014 to 30/06/2015
- July 2009 – Ongoing
 Alpha Test Srl - Via Mercalli 14, 20122 Milan
 Occasional collaboration (2009-2011), Partial copyright assignment agreement (2011- On going)
 Chemistry teacher for the preparation of medical school entrance examination in Pisa, Florence, Bologna
- November 2019
 QEC consulting Srl, via Romana Est 62, 55016 Porcari (LU)
 Occasional collaboration
 Chemistry teacher for the course “Tecnico della manutenzione e riparazione di apparecchi e dispositivi diagnostici e del collaudo sugli interventi di manutenzione/riparazione”
- December 2019 – May 2020
 Toscana Formazione Srl, Via dell’Artigianato 53/55, 57121 Livorno (LI)
 Occasional collaboration
 Material science teacher (surface treatments alternative to galvanic processes) for the course “Talenti d’oro – Tecniche di progettazione, prototipazione e produzione di manufatti orafi”

Schools

- CNIF07 – IV Corso nazionale di introduzione alla fotochimica, Chemistry department G. Ciamician (3-7 September 2007), Bologna (BO)
- AIM (associazione italiana di metallurgia) – Scuola di Metallografia per operatori di Beni Culturali (18-20 June 2008), Bologna (BO).
- INSTM (Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali) – XIV Scuola nazionale di scienza dei materiali (21-30 September 2008), Bressanone (BZ).
- AIM (associazione italiana di metallurgia) – Degradazione e protezione di manufatti metallici di interesse archeologico e storico artistico (17-19 June 2009), Ferrara (FE).
- English for scientific writing (January-February 2017) - New York English Academy (PI).
- Front-end developer (html, css, javascript, typescript, angular, database), 176 hours course – FormaTemp (April 2020).

Memberships

- INSTM member
- Lecturer university of Florence SSD Chim/02 since 26/05/2010
- Lecturer university of Florence SSD ING/IND-22 since 06/05/2019

Other assignments

- Evaluation Committee
 IMT School for Advanced Studies Lucca
 Committee member for PhD call for applications (years: 2014, 2015, 2016, 2017, 2018)
- High School Examination board member
 July 2013, Chemistry internal board member
 Istituto di Istruzione Superiore C. Livi, Prato
 Contract details: Prot. N. 1723C4 from 01/07/2013 to 09/07/2013
- Organizing Committee, 2006
 “ASPO-5: 5^o International Conference on Oil and Gas Depletion”; 18-19 July 2006, S. Rossore (Pisa)

- Organizing Committee, 2016
“GIMC-GMA 2016 XXI Convegno Italiano di Meccanica Computazionale e VIII Riunione del Gruppo Materiali AIMETA”; 27-29 June 2016, IMT School for advanced studies (Lucca)
- Organizing Committee, 2018
Open day @ MUSAM LAB, 16 July 2018, IMT School for advanced studies (Lucca)
- Chair person, 2014
“14th European Mechanics of Materials Conference - EMMC14”, Contact and Friction Mechanics session S12:4, 27-29 August 2014, Chalmers (Gothenburg)

Language Skills

Mother tongue	Italian				
Other tongues	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Listening	Reading
English	C1	C1	C1	C1	C1
	ESOL C1 (Expert)				
Japanese	A1	A1	A1	A1	A1
	JLPT N5				
	Levels: A1/2: Basic user - B1/2: Independent user - C1/2 Proficient				

Job related skills

- Electrochemical techniques: Potentiometry, Voltammetry (linear and cyclic), Chronoamperometry, Impedance spectroscopy.
- UV, IR, X-ray and fluorescence spectroscopy
- Chromatographic techniques (HPLC, GC)
- NMR spectroscopy, surface techniques (XPS) and diffraction techniques (XRD)
- Optical and electron microscopy (SEM, ESEM, FESEM)
- Vickers microhardness with indenter, profilometry (confocal and stylus profilometer)
- Mechanical testing
- Electroluminescence and infrared thermography (IR camera, pyrometer)
- Specimen preparation methods
- Galvanic deposition and thin film deposition by magnetron sputtering

Computer skills

- Very good knowledge of Internet, e-mail, office, openoffice and libreoffice software
- Good knowledge of Linux operating systems
- Good programming skills (html, css, javascript, typescript, angular) and basic knowledge of database (SQLite)
- Good knowledge of several scientific programs: ChemDraw, UV-winlab, COMSOL Multiphysics, Matlab, Mathematica, FLIR Tools, DIC 3-D, AutoCAD, Latex.

Other skills and informations

- Treasurer of a no-profit organization
- Driving license B
- Very good communication skills both in Italian and English gained through congress participation, teaching and writing scientific reports and articles
- Good managerial skills gained through congress organization

Autorizzo il trattamento dei miei dati personali ai sensi degli artt. 46 e 47 del D.P.R. 445/2000 e ai sensi dell'art. 13 del Regolamento UE 679/2016 e del D. Lgs. n. 196/2003, così come modificato dal D. Lgs. 101/2018.

Prato,
31/08/2020

