

Professor Silvia Licocchia
CURRICULUM VITAE ET STUDIORUM

1. BIOGRAPHICAL

Born Rome, Italy, October 9th, 1955.
Address: Dipartimento di Scienze e Tecnologie Chimiche
Università di Roma Tor Vergata
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Education

Laurea Summa cum Laude in Chemistry, University of Rome La Sapienza, 1978

Postdoctoral Schools:

April 1979: Theoretical Chemistry, Pisa, Italy, CNR Fellow

June 1982: Coordination Chemistry of Metalloenzymes, San Miniato, Italy, NATO Fellow

May 1986: NMR Spectroscopy, Rome, Italy

Academic Positions:

2001–present Professor of Chemistry, University of Rome Tor Vergata
2000 Visiting Professor, University of Arizona, Tucson, NATO Fellow
1993-2001 Associate Professor of Chemistry, University of Rome Tor Vergata
1992 Associate Professor of Chemistry, University of Siena
1987 Visiting Professor, University of California, Davis, CNR Fellow
1984-1992 Assistant Professor of Chemistry, University of Rome Tor Vergata
1983-1984 AIRI (Italian Association for Applied Research) Postdoctoral Fellow, University of Rome La Sapienza
1981-1983 Assistant Professor of Chemistry, University of Calabria, Italy
1979-1981 Postdoctoral Fellow, York University, Toronto, Ont., Canada

Services:

2013-present Deputy Rector for Research
2012-present Director, Department of Chemical Science and Technologies
2011-2013 Director, NAST: Center for Nanoscience, Nanotechnology and Instrumentation at Tor Vergata
2010-2014 President of AICInG (Italian Association Chemistry for Engineering)
2009-2010 Deputy Director, NAST: Center for Nanoscience, Nanotechnology and Innovative Instrumentation at Tor Vergata
2009-present Director of the Italy-Quebec Joint Laboratory on Nanostructured Materials for Energy, Catalysis and Biomedical Applications.
2009-present Director of the Teaching Supervising Committee of the Ph.D. Program in Materials for Health, Environment and Energy
2006-present Member of the Board of Directors and of the Scientific Council of NAST, Center for Nanoscience, Nanotechnology and Innovative Instrumentation at Tor Vergata
2001-2010 Secretary of the Board of Directors of AICInG (Italian Association Chemistry for Engineering)
1995-2001 Member of the Academic Senate of the University of Rome Tor Vergata.

Editorial Activity:

- Associate Editor, *International Journal of Nanoscience* (World Scientific, ISSN: 0219-581X)
- Member of the Editorial Board, *Green and Sustainable Chemistry* (Scientific Research Publishing, ISSN: 2160-6951)
- Member of the Advisory Editorial Board of *Materials for Renewable and Sustainable Energy* (Elsevier, ISSN: 2194-1459)

Awards:

2011 American Ceramic Society ACerS Ross Coffin Purdy Award

The Purdy award is given to the author or authors who made the most valuable contribution to ceramic technical literature during the calendar year prior to the selection.

Peer Review for several international Journals, among them: Journal of the American Chemical Society, Chemistry of Materials, Journal of Electroceramics, Journal of Electrochemical Society, Electrochimica Acta, Journal of Sol-Gel Science and Technology, Solid State Ionics, Journal of the European Ceramic Society, Advanced Functional Materials, Journal of Power Sources, European Polymer Journal, Journal of Applied Electrochemistry, Polymer.

Co-organizer of several Conferences and Symposia under the framework of MRS, Electrochemical Society, European Ceramic Society, AICInG.

Recently she is or has been:

- Member of the Scientific Committee of Green Energy Storage, (<http://www.greenenergystorage.eu/en/>)
- Member of the International Advisory Board for the *Euro-mediterranean Hydrogen Technologies Conference* (EmHyTeC2014)
- Chairperson of the Scientific Committee for AICInG National Workshops: 1st, Rome, 2006; 4th, Modena, 2011; 5th, Favignana 2013.
- Member of the Scientific Committee for the GEI-ERA 2012 Italian Electrochemistry Conference
- Chairperson of the Scientific Committee for the 8th and 9th AICInG National Conferences, Catania 2012 and Lecce 2014.
- Member of the Scientific Committee for AICInG National Conferences (2006, 2008, 2010)
- Member of the National Advisory Board for the X International Conference on Nanostructured Materials NANO 2010, Roma, 2010.
- Member of the International Scientific Committee for the Symposium *Materials for Polymer Electrolyte Membrane Fuel Cells*, E-MRS 2009 Spring Meeting, Strasburg, 2009
- Co-organizer of *Electroceramics VIII-2002*, European Ceramic Society Conference, August 2002

Professional Memberships:

Electrochemical Society

Materials Research Society

American Chemical Society

Italian Chemical Society

Italian Association Chemistry for Engineering

Interuniversity Consortium for Materials Science and Technology

2. TEACHING

Chemistry, B.Eng in Engineering (90 hours/average 200 students/year)

Chemistry 1, B.Eng in Engineering (60 hours/average 20 students/year)

Chemistry for Energy, B. Applied Chemistry and MSc in Environmental Engineering (60 hours/average 40 students/year)

Instrumental Analysis, PhD in Materials for Health, Environment and Energy (average 10 students/year).

Tutor for numerous Bachelor and Master Theses in Engineering, Material Science and Chemistry.

At present, tutor of 4 Ph D Students.

3. RESEARCH

Author of 4 patents, 2 books and over 250 publications, 243 of which on international refereed journals, and over 270 scientific oral contributions at international conferences, meetings and schools.

Director of the Materials and Devices for Energy Group (MaDE@Tor Vergata, <http://made.uniroma2.it/>), a research Group consisting of 2 Associate Professors, 1 Research Associate, 1 Technician, 1 Post-doctoral Fellow, 8 Ph D Students.

Her papers have been cited over 4600 times and her h-index is 39 (ISI & Scopus).

Her research activity is mainly directed towards sustainability issues, in particular towards the synthesis and characterization of nanostructured materials for energy, environmental and biomedical applications.

The research activity is now mainly focused on the study of nanostructured materials for fuel cells (polymeric, PEMFC, solid oxide, SOFC, and microbial, MFC), redox flow batteries, innovative materials for fourth generation solar cells, thermal solar, chemical sensors (semiconductor and electrochemical), composite materials for tissue engineering and regenerative medicine, model compounds for biological systems.

Research projects (2005-present)

- 2005-2006 MiUR PRIN (Italian Ministry for University and Research)
Hybrid organic/inorganic materials for multiphotonic applications via assembling of nanostructured molecular units. (€ 367,000; PI).
- 2005-2008 MiUR FISR (Italian Ministry for University and Research)
Development of composite protonic membrane and innovative electrode configurations for Polymer Electrolyte Fuel Cells (€ 620,000; Local PI).
- 2008-2009 European Union: CARISMA
Coordination Action for Research on Intermediate and high temperature Specialised Membrane electrode Assemblies. Un network di attività di ricerca in Europa (€ 15,000; Local PI).
- 2008-2010 MAE (Italian Ministry for Foreign Affairs)
Director of the Italy-Quebec Joint Laboratory on Nanostructured Materials for Energy, Catalysis and Biomedical Applications (€ 320,000; PI).
- 2008- MiUR (Italian Ministry for University and Research)
Cooperation program with the University of Uppsala (Sweden): *Novel methods for characterization of the properties of functional interfaces and nanostructured materials* (€ 10,000; Local PI).
- 2010-2012 MATTM (Italian Ministry for the Environment)
Development of MEC-based devices for the production of bio-hydrogen. (€ 456.000, PI).
- 2010-2012 MiUR PRIN (Italian Ministry for University and Research)
PC-SOFCs, Protonic Conductors Solid Oxide Fuel Cells based on nanostructured proton conductors: from materials synthesis to prototype fabrication. (€ 130,000; PI).
- 2010-2012 FILAS-POR (Piano Operativo Regionale)
Sustainable hydrogen production and waste treatment via MEC technology. (€ 138,000; Local PI).
- 2011-2014 European Union: International Research Staff Exchange Scheme
META Materials Enhancement for Technological Applications. (€ 403,000; PI).
- 2011-2013 AGER Consortium
Valorisation of winemaking by-products and waste by application of innovative technologies for extraction of natural products of high added value (€ 120,000; PI)
- 2013-2014 MIUR PRIN
Nanocomposite Advanced Membranes and innovative Electrocatalysts for Durable Polymer Electrolyte Fuel Cells, NAMED-PEM (€ 132,000; local PI)

4. INVITED CONFERENCES (selected)

- *Hydrogen and Fuel Cells related activities at the University of Rome Tor Vergata.* 5th IPHE H2 Higher Educational Rounds, Rome, 2015
- *Challenges and constraints in microbial fuel cells: development and operation.* IIT, Torino, 2014
- *Polymer Electrolyte Membrane Fuel Cells: Materials and Components.* Università di Napoli Parthenope, 2014
- *Innovative electrolytes for Polymer Electrolyte Membrane and Solid Oxide Fuel Cells.* TICME – 2011 Trento Innovation Conferences on Materials Engineering, Dicembre 2011
- *Nanostructured materials for Health, Environment and Energy.* University of Montpellier II (France), July 2009.
- *Nanostructured proton conducting materials for Fuel Cells.* Department of Physics, University of Uppsala (Sweden), August 2008.

- *Strategies to increase the operating temperature of PEMFCs: from nanocomposites to hybrids.* Advances in Materials for Proton Exchange Membrane Fuel Cells Systems 2007, Asilomar, Pacific Grove (CA, USA) February 2007
- *Polymeric Electrolytes for Intermediate Temperature PEMFCs.* 2006 MRS Fall Meeting, Boston, (MA, USA) 2006
- *Hybrid proton conducting polymeric electrolytes for intermediate temperature PEMFCs.* International Conference on "New Proton Conducting Membranes and Electrodes for PEMFCs, Assisi (Italy), 2005

5. RECENT PUBLICATIONS (Selected)

- N. Yang, C. Cantoni, V. Foglietti, A. Tebano, A. Belianinov, E. Strelcov, S. Jesse, D. Di Castro, E. Di Bartolomeo, S. Licocchia, S. V. Kalinin, G. Balestrino, C. Aruta: *Defective Interfaces in Yttrium-Doped Barium Zirconate Films and Consequences on Proton Conduction.* **Nanoscale**, **2015**, *7*, 15643-15656
- F. Caputo, M. De Nicola, A. Sienkiewicz, A. Giovanetti, I. Bejarano, S. Licocchia, E. Traversa, E., L. Ghibelli: *Cerium oxide nanoparticles, combining antioxidant and UV shielding properties, prevent UV-induced cell damage and mutagenesis.* **Nano Letters**, **2015**, *15(4)*, 2343-2349
- F. Matteocci, S. Razza, F. Di Giacomo, S. Casaluci, G. Minguzzi, T. M. Brown, A. D'Epifanio, S. Licocchia, A. Di Carlo: *Solid-state solar module based on mesoscopic organometal halide perovskite: A route toward the up-scaling process.* **Physical Chemistry Chemical Physics**, **2014**, *16(9)*, 3918-3923, in press
- N. Yang, S. Doria, A. Kumar, J. H. Jang, T. M. Arruda, A. Tebano, S. Jesse, I. N. Ivanov, A. P. Baddorf, E. Strelcov, S. Licocchia, A. Y. Borisevich, G. Balestrino, S. V. Kalinin: *Water-mediated electrochemical nano-writing on thin ceria films.* **Nanotechnology**, **2014**, *25(7)*, Article number 075701
- S. Nardis, D. Cicero, S. Licocchia, G. Pomarico, B. Berionni Berna, M. Sette, G. Ricciardi, A. Rosa, F. S. Fronczek, K. Smith, R. Paolesse: *Phenyl Derivative of Iron 5,10,15-Triitolylcorrole.* **Inorganic Chemistry**, **2014**, *53 (8)*, 4215-4227
- F. Di Giacomo, S. Razza, F. Matteocci, A. D'Epifanio, S. Licocchia, T. M. Brown, A. Di Carlo: *High efficiency CH₃NH₃Pb(3-x)Cl_x perovskite solar cells with poly(3-hexylthiophene) hole transport layer.* **Journal of Power Sources**, **2014**, *251*, 152-156
- B. Mecheri, V. Felice, A. D'Epifanio, A. Tavares, S. Licocchia: *Filler-Induced Effect on Water Sorption and Transport Properties of Nafion and Sulfonated Polysulfone Composite Membranes.* **ChemPhysChem**, **2013**, *14*, 3814-3821
- T. Pepè Sciarria, A. Tenca, A. D'Epifanio, B. Mecheri, G. Merlino, M. Barbato, S. Borin, S. Licocchia, V. Garavaglia, F. Adani: *Using olive mill wastewater to improve performance in producing electricity from domestic wastewater by using single-chamber microbial fuel cell.* **Bioresource Technology**, **2013**, *147*, 246-253
- N. Yang, A. Tebano, G. Balestrino, A. D'Epifanio, E. Di Bartolomeo, C. Pugnolini, S. Licocchia: *La_{0.8}Sr_{0.2}Ga_{0.8}Mg_{0.2}O_{3-δ} thin films for IT-SOFCs: Microstructure and transport properties correlation.* **Journal of Power Sources**, **2013**, *222*, 10-14
- E. Di Bartolomeo, A. D'Epifanio, C. Pugnolini, F. Giannici, A. Longo, A. Martorana, S. Licocchia: *Structural analysis, phase stability and electrochemical characterization of Nb doped BaCe_{0.9}Y_{0.1}O_{3-x} electrolyte for IT-SOFCs.* **Journal of Power Sources**, **2012**, *199*, 201-206.
- C. P. Brown, F. Rosei, E. Traversa, S. Licocchia: *Spider Silk as a biomaterial: tailoring mechanical properties via structural modifications.* **Nanoscale, feature article**, **2011**, *3*, 870-876
- D. Pergolesi, E. Fabbri, A. D'Epifanio, E. Di Bartolomeo, A. Tebano, S. Sanna, S. Licocchia, G. Balestrino, E. Traversa: *High Proton Conduction in Grain Boundary Free Yttrium-Doped Barium Zirconate Films Grown by Pulsed Laser Deposition.* **Nature Materials** **2010**, *9*, 846 - 852
- S. Sanna, V. Esposito, A. Tebano, S. Licocchia, E. Traversa, G. Balestrino: *Enhancement of ionic conductivity in DSC/YSZ heteroepitaxial structures.* **Small** **2010**, *6*, 1863-1867
- E. Fabbri, A. D'Epifanio, S. Sanna, E. Di Bartolomeo, G. Balestrino, S. Licocchia, E. Traversa: *A novel single chamber solid oxide fuel cell based on chemically stable thin films of Y-doped BaZrO₃ proton conducting electrolyte.* **Energy and Environmental Science** **2010**, *3*, 618-621
- C. Mandoli, F. Pagliari, S. Pagliari, G. Forte, P. Di Nardo, S. Licocchia, E. Traversa: *Stem cell aligned growth induced by CeO₂ nanoparticles in PLGA scaffolds with improved bioactivity for regenerative medicine.* **Advanced Functional Materials** **2010**, *20*, 1617-1624
- D. Marani, A. D'Epifanio, E. Traversa, M. Miyayama, S. Licocchia: *Titania Nanosheets (TNS)/Sulfonated Poly Ether Ether Ketone (SPEEK) Nanocomposite Proton Exchange Membranes for Fuel Cells.* **Chemistry of Materials**, **2010**, *22* 1126-1133
- C. de Bonis, A. D'Epifanio, M. L. Di Vona, B. Mecheri, E. Traversa, M. Trombetta, S. Licocchia: *Proton Conducting Electrolytes based on Silylated and Sulfonated Polyetheretherketone: Synthesis and Characterization.* **Journal of Polymer Science, Part A, Polymer Chemistry** **2010**, *33*, 2178-2186
- B. Mecheri, A. D'Epifanio, L. Pisani, F. Chen, E. Traversa, F. C. Weise, S. Greenbaum, S. Licocchia: *Effect of a proton conducting filler on the physico-chemical properties of SPEEK-based membranes.* **Fuel Cells** **2009**, *9*, 372-380
- C. de Bonis, A. D'Epifanio, M. L. Di Vona, C. D'Ottavi, B. Mecheri, E. Traversa, M. Trombetta, S. Licocchia: *Proton conducting hybrid membranes based on aromatic polymers for Direct Methanol Fuel Cell Applications.* **Fuel Cells** **2009**, *9*,

387-393

→ A. Rinaldi, B. Mecheri, V. Garavaglia, S. Licocchia, P. Di Nardo, E. Traversa: *Engineering materials and biology to boost performance of microbial fuel cells: a critical review*. **Energy and Environmental Science** **2008**, *1*, 417- 429