

Curriculum Vitae of Monica Santamaria

PERSONAL DATA

Birth: 30/11/1973 in Licata (Italy)
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EDUCATION

- Jan 1998 - Feb 2001 Ph.D. in Electrochemical Engineering, at Politecnico di Milano (part of the experimental work was carried out at the "Corrosion and Protection Centre" dell'UMIST, University of Manchester (UK) Institute of Science and Technology, under the supervision of Prof. G. Thompson)
- Oct 1991 - Apr 1997 Master degree in Chemical Engineering at Chemical Engineering Department of Università degli Studi di Palermo, achieved with mark 110/110 cum laude.
- July 1991 Classical Leaving Certificate (high school) achieved with mark 60/60 cum laude, at "Liceo Classico V. Linares - Licata".

APPOINTMENTS

- Dec 2010 - present Professor of Electrochemical energy conversion and storage at Università degli Studi di Palermo
- April 2002 - Dec 2010 Assistant professor of Applied Electrochemistry

HONOURS AND AWARDS

- July 2006 Hans-Jürgen Engell Prize 2006, awarded by the International Society of Electrochemistry *"for her excellent work in the characterization of anodic oxide films as a function of their degree of hydration by photocurrent spectroscopy and electrochemical impedance spectroscopy, and the development of a model describing the electronic properties of amorphous semiconductor/electrolyte junctions"*.
- March 2009 Invited lecture at the Faculty of Chemistry of Università di Palermo (Italy) on *"Electrochemical Material Science: challenges and perspectives"*.
- September 2010 Invited lecture during E-MRS 2010 Fall Meeting, September 13-17, 2010, Warsaw, Poland on *"Photocurrent Spectroscopy Applied to the Characterization of Compositionally and Structurally Graded Materials: from Thin Films to Nanostructures"*
- September 2010 Invited lecture during The 61st annual meeting of International Society of Electrochemistry, Nice (France) September 26th - October 1st, 2010. on *"The Influence of Surface Treatment on the Kinetic of Growth of Anodic Films on Magnesium in Alkaline Solution"*
- September 2013 Invited lecture during The 64th annual meeting of International Society of Electrochemistry, Queretaro (Mexico) September 8th - 13th, 2013 on *"Effect of Thermal Treatment on the Physico-Chemical Properties of Porous Anodic Films on Iron"*
- June 2014 Invited lecture during 2nd International Symposium on Anodizing Science and Technology (AST2014) Sapporo (Japan), 4-7 June 2014. on *"Effect of incorporation of foreign species on the solid state properties of anodic films on Ti"*

MAIN RESEARCH INTERESTS

Research activity is mainly concentrated on:

1- Mechanism of growth and breakdown of anodic oxide films on valve-metals and valve-metals alloys.

This research theme is devoted to understand the mechanism of growth and breakdown of anodic oxide films which are currently used for the fabrication of electrolytic capacitors and as possible candidates for replacing SiO₂ oxide in thin film of metal/oxide/semiconductor (MOS and MOM) structures. The final aim is to optimize anodizing process and develop dielectric film with tailored properties.

2 - Characterization of corrosion layers and passive films by Electrochemical Impedance Spectroscopy (EIS) and Photocurrent Spectroscopy (PCS).

Research in this subject is aimed to correlate the corrosion behaviour of metals and alloys to the nature of passivating film and corrosion layer by in situ analytical techniques. In the case of PCS technique a semiempirical correlation between the optical band gap of corrosion layer and film composition has been proposed and it is still under scrutiny for complex systems.

3 - Photoelectrochemical fabrication of hybrid inorganic/organic (conducting polymers) junctions

The expertise on the formation of anodic films and on their photoelectrochemical properties have been used to design the fabrication of metal/oxide/conducting polymers junctions to be used in electronic components. Photoelectrochemical processes were used to grow conducting polymers on semiconducting or insulating oxides.

4 - Electrochemical growth of nanostructure by template assisted method or by anodizing.

The aim of this research is the electrochemical production of nanostructured materials for possible applications in different technological fields (catalysis, photoelectrochemical energy conversion, etc) by using porous alumina membranes as template or by anodizing metals in properly selected conditions. A study of the influence of electrochemical parameters on the properties of nanowires or nanotubes and their characterization, by in situ and ex situ techniques, are carried out in order to tailor their properties.

5 - Preparation of proton conductors for low temperature fuel cells.

This research is devoted to the fabrication of porous alumina membranes with assigned porous structure, depending on the anodizing conditions, as well as to the functionalization of such membranes with ionic conductors to be used in thin film fuel cells working in a rather wide range of temperatures. More, recently research efforts have devoted to the fabrication of hybrid organic/inorganic proton conducting membranes for low temperature H₂ fed fuel cells.

She presented the results of her work in several international meetings and she is author of more than 90 papers published on international journals and books.

TEACHING EXPERIENCE

September 2015 – present	“Corrosion and protection of aerospace materials” for master students in Aerospace Engineering at Università di Palermo
September 2014 – present	“Corrosion and protection of metallic materials for building engineering” for master students in Building Engineering at Università di Palermo
September 2010 - present	"Chemistry" for undergraduate students in Civil Engineering at Università di Palermo
Jan 2006 - present	"Electrochemical Energy Conversion and Storage" for master students in Chemical Engineering at Università di Palermo.

SELECTED SYNERGISTIC ACTIVITIES

Member of

Italian Chemical Society

Electrochemical Society

International Society of Electrochemistry

Coordinator of the organizing committee of “Corrosion Science and Engineering” Symposium of the 63rd ISE annual meeting (19-24 August, 2012, Prague, Czech Republic)

Member of the organizing committee of “Corrosion, Passivity and Oxide Films” Symposium of the 65th ISE annual meeting (31 August – 5 September, 2014, Lausanne, Swiss)

Member of the organizing committee of 17th Topical Meeting of the International Society of Electrochemistry, “Multi-scaled Analysis of Electrochemical Systems” at 31 May - 3 June 2015, Saint-Malo, France.

Member of the Committee in charge of awarding the International Society of Electrochemistry Prize for Electrochemical Materials Science

INVITED TUTORIAL LECTURES

“Photocurrent Spectroscopy applied to the characterization of passive films on metals and alloys” at POLITEHNICA of Bucharest (Romania) June 2002

“Photocurrent Spectroscopy Applied to the Characterization of Compositionally and Structurally Tailored Materials: from Thin Films to Nanostructures” at Ruhr-Universität Bochum, Bochum (Germany) June 2013