6th European Summer School on Electrochemical Engineering

September 16-21, 2012, Zadar, Croatia

Lectures & Book of Abstracts

Faculty of Chemical Engineering and Technology, University of Zagreb

6th European Summer School on Electrochemical Engineering Lectures and Book of Abstracts

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A CIP catalogue record for this book is available from the National and University Library in Zagreb under 813764 Scientific Committee and Advisory Board Achille De Battisti, University of Ferrara, Italy Symeon Bebelis, University of Patras, Greece Karel Bouzek, Institute of Chemical Technology Prague, Czech Republic Christos Comninellis, EPFL, Switzerland Ann Cornell, KTH Royal Institute of Technology, Sweden Arjan Hovestad, TNO Science & Industry, Netherlands Zoran Mandić, Unviersity of Zagreb, Croatia Francois Lapicque, Nancy Université, France Manuel Rodrigo, University of Castilla la Mancha, Spain Velizar Stanković, University of Belgrade, Serbia Frank Walsh, University of Southampton, UK

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Program

Sunday, September 16, 2012.

16:00 - 20:00	Participants registration	
20:00 -	Welcome party	
Monday, September 17, 2012.		
09:00 - 09:15	The opening ceremony	
	FUNDAMENTALS	
09:15 - 11:00	Electrochemical engineering: Fundamentals, scope, basic relationships and parameters	
	Francois Lapicque, CNRS- University of Nancy, France	
11:00 - 11:30	Coffee break	
11:30 - 13:00	Charge transfer fundamentals: thermodynamics and kinetics	
	Symeon Bebelis, University of Patras, Greece	
13:00 - 15:00	Lunch	
	ELECTROCHEMICAL REACTORS	
15:00 - 16:45	Design and modelling of electrochemical reactors	
	Karel Bouzek, Institute of Chemical Technology, Czech Republic	
16:45 - 17:15	Coffee break	
17:15 - 19:00	Scale-up of electrochemical reactors and processes. Mass and energy balances	
	Geoff Kelsall, Imperial College, UK	
Tuesday Senter	mber 18, 2012	
100.00 - 11.00	The importance of catalysis in the electrochemical owner transfer reactions (FOTR)	
09.00 - 11.00	Christos Compinellis EPEL Switzerland	
11.00 11.30		
11.00 - 11.30	Membrane engineering in electrochemical systems	
11.30 - 13.00	Karel Bouzek Institute of Chemical Technology Czech Pepublic	
13.00 15.00	Lunch	
15.00 - 15.00		
15:00 - 16:45	Electrochemical synthesis of organic and inorganic products and intermediates	
13.00 10.43	Ann Cornell KTH- Royal Institute of Technology Sweden	
16.45 - 17.15	Coffee break	
17:15 - 19:00	Electrowinning of metals and metal recovery	
17.15 17.00	Velizar Stanković University of Belgrade Serbia	
	Venzal Stanković, oliverský or betgrade, serbia	
Wednesday, Sep	otember 19, 2012.	
	ELECTROCHEMICAL ENGINEERING IN ENVIRONMENTAL PROTECTION	
09:00 - 10:30	Treatment of industrial wastewaters by eletrochemical methdos: principles, present status,	
	prospects and advanced methods	
	Manuel Rodrigo, Universidad de Castilla la Mancha, Spain	
10:30 - 10:45	Coffee break	
10:45 - 12:15	Fundamentals of ElectrochemicalWater Disinfection Focusing on Inline Electrolysis	
	Henry Bergmann, Anhalt University, Germany	
12:15 - 13:30	Poster session	
13:30 - 15:00	Lunch	
15:00 -	EXCURSION	

Thursday, September 20, 2012.

	ELECTROCHEMICAL ENERGY CONVERSION AND STORAGE
09:00 - 10:30	Design and engineering of electrode materials for Li-ion batteries
	Miran Gaberšček, National Institute of Chemistry, Slovenia
10:30 - 11:00	Coffee break
11:00 - 12:30	Engineering aspects of fuel cells
	Frano Barbir, Unversity of Split, Croatia
12:30 - 14:30	Lunch
14:30 - 16:00	The role of PEM fuel cells in energy storage in microgrids
	Željko Ban, University of Zagreb, Croatia
16:00 - 16:30	Coffee break
16:30 - 18:00	Practical demonstration of the operation of fuel cells
18:00 - 19:30	City of Zadar sightseeing
20:00	Social Dinner

Friday, September 21, 2012.

CORROSION PROTECTION ENGINEERING	
09:00 - 10:30	Electrochemical basis of corrosion processes and protection
	Mario Ferreira, Universidade de Aveiro, Portugal
10:30 - 11:00	Coffee break
11:00 - 12:30	Engineering aspects of corrosion protection
	Sanja Martinez, Universiy of Zagreb, Croatia
12:30 - 13:30	Final discussion, exams and certificates
13:30 - 15:00	Lunch

Curricula vitae of the Lecturers

6th European Summer School on Electrochemical Engineering

François Lapicque

CNRS Research Professor in the Laboratory of Reactions and Chemical Engineering (LRGP, UPR CNRS 3349 – Nancy University) 55 years Home address 21 bis rue Sellier, F-54000 Nancy Professional address LRGP, CNRS-Nancy Université, BP 20451, 54001 Nancy Phone: (+33) 3 83 17 52 66 Fax: (+33) 3 83 32 29 75 francois.lapicque@ensic.inpl-nancy.fr

Research activities

- Electrochemical Engineering: waste treatment using electrochemical techniques (electroleaching, electrocoagulation, electrode direct conversion), clean processes, transfer phenomena, electrosynthesis and electrodeposition processes, CO₂-free iron production by hematite electrolysis.
- Electrochemical conversion of energy:
 - Fuel cells: reaction kinetics, technology, ageing phenomena, dysfunction of fuel cells, modeling CHP units and reformers.
 - o Batteries: characterisation of ageing phenomena using impedance spectroscopy
 - o Water electrolysis: modeling of solid oxide electrolysis cells, PEM electrolysis

About 130 papers published, 19 invited lectures, 32 PhD prepared under my supervision, 6 chapters in specialized books in engineering sciences and in fuel cell technology. One book in preparation. Collaboration with various labs, research centers and industrial partners (Saft, Hélion, GdF, EdF-ElfER, R. Bosch GmbH, Pragma ...).

Dr Symeon Bebelis

Born in 01/01/1959, graduated from the School of Chemical Engineering, National Technical University of Athens, Greece in 1981. He holds a PhD from the Department of Chemical Engineering, University of Patras (1989), Greece, where he currently serves as Associate Professor and Head of the Division of the Chemical Technology and Applied Physical Chemistry. He has authored approximately 60 papers in international refereed journals (citation index ~2025, excluding self-citations), related mostly to solid state (high temperature) electrochemistry and heterogeneous catalysis, 25 papers in scientific series and proceedings of international conferences as well as 4 books and chapters in books. He has been Guest Editor of Solid State Ionics and Journal of Applied Electrochemistry, Chairman of the EFCE Working Party on Electrochemical Engineering (EFCE/WPEE) from 2007 to 2010, and member of the organizing committee of 7 international conferences and summer schools (chairman in 4 of them). He is currently Regional Representative of Greece in the International Society of Electrochemistry, member of the EFCE/WPEE (since 1996) and member of the Editorial Board of the Journal of Electrochemical Science and Engineering. He has participated in approximately 60 international conferences and summer schools, having been invited (as plenary, keynote or invited lecturer) in 10 of them. He has been advisor of 3 PhD theses and project leader or coordinator of 13 research projects, also participating in many others. His current research activities focus mainly on solid oxide fuel cells (SOFC) study and development, in particular on catalytic and electrochemical testing of SOFC materials and components.

Prof. Ing. Dr. Karel Bouzek

Born	July 5 th 1968
1991	MSc. thesis in the field of Inorganic Technology at Institute of Chemical Technology Prague (ICTP)
1997	Ph.D. thesis at ICTP (Electrochemical Synthesis of Ferrates)
2001	habilitation at ICTP
2005	appointed as a full professor in the field of Inorganic Technology at ICTP
Current position:	head of the Department of Inorganic Technology, vice dean of the Faculty of Chemical Technology, ICTP
Fields of interest:	technical electrochemistry and electrochemical engineering with a focus on the water treatment, fuel cells and water electrolysis technology, including mathematical

modelling.

Membership in the scientific organizations' and other related activities: Czech Chemical Society (member), Czech Society of Chemical Engineering (member of the board), Czech Society of Industrial Chemistry (member of the board), Czech Hydrogen Technology Platform (chair of the board), Czech Membrane Platform (member), Electrochemical Society (member), International Society of Electrochemistry (vice-chair of the division 5: Electrochemical process engineering and technology), Working party on Electrochemical Engineering at EFCE (representative of the Czech Republic), Council of the Institute of Physical Chemistry of J. Heyrovsky of the Academy of Sciences of the Czech Republic (member), Council of the Institute of Inorganic Chemistry of the Academy of Sciences of the Czech Republic (member), Grant Agency of the Academy of Sciences of the Czech Republic (member).

Activity within the last five years: coordination of task of the European research project dealing with the problematic of the microstructured reactors, participation in the three European projects in the field of fuel cells and water electrolysis (coordination of the task focused on the polymer electrolyte membrane development for the water electrolysis process), coordination or participation in seven research project financed by Czech Science Foundation, Ministry of education, youth and sports of the Czech Republic and Ministry of Industry and Trade of the Czech Republic, supervising of the master and Ph.D. students, organisation of the European Summer School etc. The main attention is focused on the polymer electrolysis, development of alternative catalyst supports Membrane Electrode Assembly optimisation and cells set-up. Recently activity in the field of fuel cells and water electrolysis mathematical modelling was initiated.

Geoff Kelsall

After a Ph.D. project on fluidised bed electrodes at the University of Southampton, UK, Geoff Kelsall worked as an electrochemical research engineer at the (former) Electricity Counci Research Centre (Chester, UK), before in 1979 moving to Imperial College London, where he became Professor of Electrochemical Engineering in 1994. In 1998, he was appointed to the NSERC Industrial Research Chair in Electrometallurgy, University of British Columbia, Vancouver, Canada. In 2000, he returned to Imperial College London, where his present research projects (www.imperial.ac.uk/electrochemical-engineering) involve the conception, design, characterisation, modelling and optimisation of novel reactors and processes for electrolytic processes, high temperature fuel cells and prospective photo-electrochemical processes for harvesting and storing solar energy as H₂ and other fuels. In 2007, he was awarded the SCI Castner Medal for outstanding contributions to electrochemical engineering.

Christos Comninellis, Prof. Hon.

During the four decades of his academic career at the EPFL-Lausanne-Switzerland, Christos Comninellis has published over 250 scientific papers, been granted 15 patents, and directed some 30 doctoral theses. He has participated in over 150 international symposia, giving numerous plenary lectures during the past years. He has served as president of the Evaluation Committee of the Faculty of Basic Sciences for six years and has been member of the jury of the EPFL prize for outstanding PhD-thesis for more than ten years. In 2008 he was elected Fellow of the International Society of Electrochemistry, in recognition of his seminal contribution to the progress of modern electrochemistry. He is member of the advisory board of Electrochimica Acta and the editorial board of Journal of Applied Electrochemistry. Recently a special issue of the Journal of Applied Electrochemistry has been dedicated fir his 65th anniversary.

Of all of his accomplishments, the greatest impact on applied electrochemistry has been through the development of a model of organics anodic oxidation and its application to electrosynthesis and electrochemical wastewater treatment, through development and pioneering application of new electrode materials like DSA-types anodes and boron-doped diamond, and through understanding new phenomena like electrochemical promotion of catalysis.

Ann Cornell

Ann Cornell is at present Associate Professor in Chemical Engineering at KTH Royal Institute of Technology in Stockholm, Sweden. After receiving her MSc in 1987 she worked for 15 years in industry (today AkzoNobel) with R&D in the field of chemical and electrochemical engineering, mainly with the development of industrial chlorate electrolysis. She also conducted academic research and in 2002 she received a PhD in chemical engineering on "Electrode Reactions in the Chlorate Process". Since 2003 Ann works in the group of Applied Electrochemistry at KTH, still conducting research related to industrial electrolysis in collaboration with AkzoNobel but has also broadened her interests to areas as cellulose based Li-ion batteries and electrically assisted debonding of adhesives. Regarding education, Ann is responsible for the master program "Chemical Engineering for Energy and the Environment" at KTH and teaches courses in chemical engineering and in applied electrochemistry.

Velizar Stanković

Department of Metallurgical Engineering, Technical Faculty Bor, University of Belgrade, Serbia; Phone:+381 (0)30 424555; Fax: +381 (0)30 421078; E-mail: vstankovic@tf.bor.ac.rs Born 1943 in Radmirovac, Svrljig, Serbia (former Yugoslavia)

Education

Velizar Stankovic received his B. Eng. degree in Chemical Engineering at the Faculty of Technology and Metallurgy University of Belgrade in 1968; graduated as M.Sc. 1978 and finished his Ph.D. studies 1983 at the same Faculty.

Teaching activities

From 1968 to 1983 he was working at the Department of Extractive Metallurgy and Metallurgical Engineering, Technical Faculty Bor, firstly as an assistant in the Laboratory of Metallurgical Operations to continue as Lecturer, Docent, Associated Professor, to be 1994 appointed Professor in Transport Phenomena and Metallurgical Operations at the same Department. In 2010 he was ended his official teaching and research carrier going to retirement.

At the Technical Faculty he was teaching the following courses at under- and postgraduate studies: Transport Phenomena and Metallurgical Operations; Hydrometallurgy; Industrial Wastewaters Treatment; as well as Unit Operations at the Department of Inorganic Chemical Technology; also Transport Phenomena Course I and II at Master and Doctoral studies. Currently, hi is active only at postgraduate studies. He published a book titled (in translation): Transfer Phenomena and Unit Operations in Metallurgy Vol. I – Mechanics of Fluid and Dispersed Systems; Vol. II - Heat and Mass Transfer. He was either thesis director or the member of jury at the Technical Faculty and in several cases at foreign universities.

Research work

His research work was focused on the mass and momentum transfer in electrochemical reactors; mass transfer enhancement; electrochemical reactors with three-dimensional electrode; electrowinning of metal ions; electroplating; separation and concentration techniques for heavy metal ions removal from industrial and mining effluents; electrochemical promotion of catalysts; wastewater purification. During '80s he had four brief visits, in duration of at least three weeks, to Chemical Engineering Department at University of Exeter. In the period from 2001 to 2003 he was a visiting professor in summer semesters at the Faculty of Basic Sciences of the EPFL Lausanne, Switzerland working on research projects and giving some lectures to Ph.D. students. Professor Stanković has more than 100 scientific papers and presentations in symposia proceedings, including key-note and plenary lectures.

He was a member of scientific and organizing committee of numerous scientific meetings and symposia; also the organizer of the 4th ESSEE. He is an active member of the Serbian Chemical Society; as well as of ISE and EEWP; He is also a member of the Editorial Board of the Journal of Mining and Metallurgy.

Prof. Manuel Rodrigo

Manuel Rodrigo was born in Plasencia (Spain) in 1970. He studied Industrial Chemistry at the University of Valencia, where he was graduated at the top of his class in 1993. He also got the PhD degree in Chemical Engineering in the University of Valencia in 1997, working on the development of automation systems for biological nutrient removal processes. In 1997, he joined the University the Castilla La Mancha as assistant professor, being the responsible of starting a new research line in electrochemical engineering at the Department of Chemical Engineering. In this first electrochemical stage, his research was focused on the electrolyses of wastewaters polluted with organics. After a first postdoctoral training in the Lab of Prof. Comninellis (EPFL, Switzerland), he started working with diamond electrodes, one of the key topics in his research, in which a large study about the applicability of the technology to the treatment of actual industrial wastewaters has been carried out. In 2000, he got the position of Associate Professor at the University of Castilla La Mancha, and started working on electrocoagulation of wastewaters, and also on high temperature PEM fuel cells. Afterwards, oxidants production, microbial fuel cells and soil electro-remediation have also focused his research attention. In 2009 he was promoted to Full Professor of Chemical Engineering at the same University. He maintains strong consultant collaboration with many companies in energy and environmental engineering. He is author of more than 150 papers in referenced journal and books, more than 60 technical reports for companies, two patents, and he has supervised eight doctoral theses. At present, he is the vice-dean of Chemical Engineering in the Faculty of Chemical Sciences of the University of Castilla La Mancha. He is an active member of Working Party of Electrochemical Engineering of the European Federation of Chemical Engineering and chaired the 5th Summer School on Electrochemical Engineering carried out in Spain in 2009.

Prof. Dr.-Ing. Henry Bergmann

Professor of Electro-Technologies and Environmental Protection Technologies Vice Director of Institute for Energy and Environmental Protection Technologies Koethen e.V., Speaker of the dual study courses "Solar Energy (Photovoltaics)"

Anhalt University of Applied Sciences

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Vitae

- 1974- "Abitur" Degree-Extended High School (GDR)/ABF Halle
- 1980- diploma degree "With excellence" in the field of "Electrochemical Technologies", Moscow Mendelejev Institute of Chemical Technologies
- 1980-1990 scientific assistant at University of Engineering Köthen
- 1986- PhD 'With Excellence' (summa cum laude) in the field of Reaction Engineering/Electrochemical Engineering, Prof. Hertwig / Prof.Thiele
- 1990 assistant professor at the Technical University Köthen
- After being employee at Uhde/Dortmund, 1993 professorship at the Anhalt University of Applied Sciences

Teaching courses

- Fundamentals of Technologies for Environmental Protection
- Fundamentals of Electrochemistry
- Introduction into Photovoltaics
- Application of Photovoltaics
- Thermal Engineering I/II
- Analysis Technologies
- Regenerative Energies, Energy Technologies
- Electronics Design
- Hygiene Technologies (Master Course of Biomedical Engineering)

Research profile

- -Chlor-alkali electrolysis (in the past)
- -Modelling and development of electrochemical reactors
- -Processes and reactors of electrochemical waste water treatment
- -Electromembrane processes/Electrodeionization
- -Electrochemical water disinfection
- -History of regenerative energies (windmills)

Membership: DECHEMA, ACS, Working Party EFCE and others

Ca. 115 several publications, 220 lectures and poster presentations, 24 patents

Dr. Miran Gaberšček, Associate Professor

Education

Diploma, Master and Ph.D. Theses 1987-1994, Faculty of Chemistry and Chemical Technology (formerly Faculty for Natural Sciences and Technology), University of Ljubljana, Slovenia.

Studies at Foreign Institutions

- 1992–1993 (12 months): Technical University Graz, Austria, Mentor: Prof. Dr. Gerhard Herzog.
- 1994: guest scientist at Case Western Reserve University, Cleveland, Prof. Dr. Mark De Guire

Employments

- 1. National Institute of Chemistry, Ljubljana, Slovenia (since 1987). Current position: Scientific Councillor
- 2. Part time work: Teaching assignments at Materials Science Courses at Faculty of Chemistry and Chem. Technol., University of Ljubljana (since 2003).
- 3. Part time work: Centre of Excellence Low-carbon technologies (Director, since 2009)

Teaching

- Assistant to Materials Science Courses at Ljubljana University: 1990–2003.
- Assistant Professor for the field of Materials Science, Ljubljana University (since 2003).
- Associate Professor for the field of Materials Science, Ljubljana University (since 2008).

Other professional activities

- Editor of several journals (Acta Stereologica, Image Analysis and Stereology, Solid State Ionics (2004),
- Organisation of 5 international symposia
- Leader of Theory group in the European Research Institute ALISTORE
- Leader of 4 international and 4 national project
- Director of the Centre of Excellence Low-carbon Technologies, "CO NOT" (5 academic+10 industrial partners)

Publications: 115 papers, 3 patents, 4 PCT patent applications

<u>Awards</u>

- F. Pregl award for Oustanding Achievements in Chemistry and Related Fields, 2010
- Prometheus of Science for Excellence in Scientific Communication (»Prometej znanosti za odličnost v komuniciranju«), 2009
- Eight International Competition Young Europeans' Environmental research, Leipzig, 23rd November 1997 : [awarded the 3rd prize], (Author: D. Strmčnik, Mentor: M. Gaberšček).
- Mentor to 4 student Prešeren Awards and 3 Awards by Pharmaceutical Company Krka

Examples of achievements:

- 1. Invention of new compounds and materials for use in advanced batteries
- 2. Invention of new materials for use in electrocatalysis (fuel cell devices)
- 3. Explanation of transport phenomena in battery electrodes (occurence of hysteresis, particle size effect, the role of inter-phase contacts etc.)
- 4. Explanation of transport phenomena in mesoporous systems (application in drug delivery)
- 5. Impedance modeling (applications: corrosion systems, batteries, sensors)

Frano Barbir



Dr Frano Barbir is a professor at Faculty of Electrical, Mechanical Engineering and Naval Architecture, University of Split, Croatia. He has spent more than a half of his 30-year engineering career directly involved in development of polymer electrolyte membrane (PEM) fuel cells and fuel cell systems in the U.S., in both industry and academia. He is the author or co-author of more than 200 publications on fuel cells and hydrogen energy, published in technical and scientific journals, books, encyclopedias and conference proceedings, including 7 U.S. patents on various aspects fuel cell stack and system design and operation, and the book PEM Fuel Cells: Theory and

Practice, (Elsevier/Academic Press, 2005). He serves on the Board of Directors of the International Association of Hydrogen Energy and he is the Editor Emeritus of the International Journal of Hydrogen Energy. He holds a Ph.D. degree in mechanical engineering from University of Miami, and M.Sc. in chemical engineering and Dipl.-Ing. in mechanical engineering, both from the University of Zagreb, Croatia.

Željko Ban

Position:Associate professorOrganisatio:University of Zagreb, Faculty of Electrical Engineering and
Computing, Department of Control and Computer EngineeringWebsite:http://www.fer.unizg.hrEmail:zeljko.ban@fer.hrPhone:+385 1 6129 854

Željko Ban was born on 1962 in Republic of Croatia. He received B. Sc., M. Sc., and PhD degrees from the University of Zagreb, Faculty of Electrical Engineering and Computing in 1985, 1991, and 1999 respectively.



Between 1985 and 1988 he worked as research fellow at Koncar -Institute of electrical engineering in Zagreb. Since 1988 he has been with the Faculty of Electrical Engineering, University of Zagreb. His current position is the associate professor at Department of Control and Computer Engineering in Automation, Faculty of Electrical Engineering and Computing, University of Zagreb.

His research interests were concerned on adaptive and optimal control of the electrical drives and intelligent and adaptive control of the systems. From the 2006 his research activities were concerned on intelligent control of the fuel cell energy sources, as well as control of the micro grid consist of photovoltaic systems, fuel cell systems and wind energy sources.

Since 1988, Ž. Ban was involved in several scientific projects financed by Ministry of science and technology of Republic of Croatia as a researcher in area of mathematical modelling and simulation of the system and adaptive and optimal control.

Since 2002 he was project leader of two projects financed by Ministry of science and technology of Republic of Croatia. Projects were as follows: Intelligent and adaptive control of the systems, and Control system of the fuel cells energy source with the cogeneration.

Besides that, Ž. Ban was involved in several projects in cooperation with the Croatian industry related to modelling simulation and controller design of the system. He was also involved in the cooperation with United Technology Research Centre, East Hartford, USA in research problems related to Solar Irradiance, Wind Speed and Wind Turbine Models for the design and control of Hybrid Power Systems. Currently he is involved as a team member in the FP7 ACROSS project.

Research Interests

Scientific fields of interest: modelling and simulation of the technical systems, advanced control theory, adaptive control, alarm systems.

Application: Control of the electric drives, control of the fuel cell systems, control of the DC/DC, and DC/AC controllers, control of the micro grid.

Mario Ferreira



Mario Ferreira got his degree in Chemical Engineering in 1971, from Instituto Superior Técnico, Portugal, and his PhD degree in Corrosion Science and Engineering from UMIST - The University of Manchester Institute of Science and Technology, UK, in 1981. In 1993 he received his "Agregação" title in Chemical Engineering, from Instituto Superior Técnico. Currently, Mário Ferreira is Full Professor in the Department of Materials and Ceramic Engineering at University of Aveiro, Portugal. From 2003 to 2007 he was Deputy Director General for Higher Education at the Ministry of Science, Technology and Higher Education. In 2011, he was nominated Director of the Department of Materials and Ceramic Engineering and Ceramic Engineering of the University of Aveiro. He has also been Adjunct Full Professor

of the Chemical Engineering Department of Instituto Superior Técnico.

He is member of several scientific societies, namely Portuguese Order of Engineers, Portuguese Materials Society, Portuguese Society of Electrochemistry (co-founder), Institute of Corrosion (United Kingdom), International Society of Electrochemistry, Electrochemistry Society (United States of America), National Association of Corrosion Engineers - NACE (United States of America) and Matsumae International Foundation (Japan). He is also a member of the European Federation of Corrosion, serving presently as member of its Board of Administrators, and of the International Corrosion Council where he is Portuguese delegate.

His main scientific interests are focused on the study of Materials Degradation and Development of Nanostructured Materials for Surface Engineering. He has edited 4 scientific books, published more than 250 articles on scientific journals, having more than 300 communications in conferences. He was responsible for 55 R&D projects, totally or for the Portuguese participation, co-financed by several national entities, by the European Commission (namely Framework Programmes) and by NATO.

Sanja Martinez

Sanja Martinez has in 1993 graduated from the University of Zagreb, Faculty of Sciences with B. Sc. in solid state physics and has obtained her PhD in 2000 in the field of chemical engineering at the University of Zagreb, Faculty of Chemical Engineering and Technology where she currently works as an associated professor. She teaches electrochemistry and corrosion related subjects at the undergraduate and graduate levels and is head of the University Interfaculty Postgraduate Specialist Study "Corrosion and Protection". Being an engineer of physics and having a PhD in chemical engineering, she has a wide range of scientific interests, the most important of which are investigation of the corrosion processes and protection methods and exploring antioxidant chemistry and electrochemistry in food and biological samples. Her current scientific project is entitled: "Biomolecules as Corrosion Inhibitors - from the Molecular Models to Application". She takes particular interest and is involved in solving industrial engineering corrosion problems, such as design of cathodic protection systems, internal and external corrosion direct assessment, corrosion monitoring, inspection and management. Sanja Martinez is also engaged in the conservation, restoration and preservation of objects and structures made of metal or metallic alloys, of archaeological, artistic, or historical origin. She is a national contact person for Croatia of the International Council of Museums - Committee for Conservation Metal Working Group. She is an active member of many domestic and international professional organizations and was the leader of the project entitled Croatian Professional Terminology in the Field of Corrosion and Protection. Sanja Martinez is active in the field of standardization and has for many years been president of the Technical Committee 504 - Corrosion and Protection of Metals and Alloys of the Croatian Standards Institute.