



Barbara Bosio

Associate professor

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Education and training

2000

PhD in Chemical Engineering

Development of Fuel Cell Technologies

Politecnico di Torino - consortium with UNIGE and POLIMI - Torino - IT

1996

Master degree in Chemical Engineering

Modelling and Numerical Evaluation of the Equilibrium and Precipitation Conditions of Mercury in Aqueous Solutions in the Presence of Complex Reactions and Adsorption Phenomena - 110/110 cum laude

Università di Genova - Genova - IT

1990

High school diploma (classical studies)

60/60

Liceo Classico C. Colombo - Genova - IT

Academic experience

2011 - ONGOING

Associate Professor of Chemical Engineering Principles

Univeristà di Genova - Genova - IT

2008 - 2012

Contract Professor

Università di Trento - Trento - IT

1996 - 2011

Contract Researcher

Università di Genova - Genova

Teaching activity

Main teachings from 2011:

- Principles of Chemical Engineering 1, Mod. 1: Transport Phenomena at the Macroscopic Level

- Principles of Chemical Engineering 2, Mod. 2: Transport Phenomena at the Local Level

New teachings from 2018:

- Industrial Processes and Products, Mod. 1: Renewable Energy Production

Previous teachings:

- Environmental Chemistry and Processes, Mod. 1: Fundamentals of Environmental Processes (Genova, 2018-2019)

- Multiscale analysis and computer simulation of chemical processes (Genova, 2017-2018)

- Applications of Process Engineering (Genova, 2012-2013)

- Innovative Chemical Processes (Genova, 2011-2012)

- Principles of Chemical and Food Engineering (Trento, 2011-2012)

- Simulation of Fuel Cell Systems (Genova, 2009-2010)

- Principles of Environmental Engineering (Trento, 2008-2009)

- Heterogeneous Chemical Kinetics (Genova, 2006-2007).

Responsible of the first Double Degree in Chemical and Process Engineering at the University of Genoa, partner the University of Liège.

Tutor of around 10 master or bachelor theses per academic year.

Responsible of Erasmus Programs for studies with University of Edinburgh and Université de Liège.

Responsible of Erasmus Programs for traineeship with Technische Universität München, University College Cork, Arup Deutschland GmbH.

Postgraduate research and teaching activity

Supervision of PhD students, residents and post-doctoral fellows

Supervisor of the following Ph.D. students at UNIGE:

- Fiammetta Rita Bianchi, *Solid Oxide Cell Modelling*, XXXIV ciclo;

- Emilio Audasso, *Simulation of high temperature fuel cells*, XXXIII ciclo;

- Bruno Conti, *Solid Oxide Fuel Cells: numerical and experimental approaches*, XXXI;

- Cristina Moliner, *Valorisation of agricultural residues*, XXVIII ciclo, double degree with Polytechnic University of Valencia (*supervisor* with Elisabetta Arato e Amparo Ribes);

- Nicola Di Giulio, *Theoretical and experimental analysis of Molten Carbonate Fuel Cell performance in innovative applications*, XXVI ciclo;

- Danilo Marra, *Fluid-dynamic characterisation of molten carbonate fuel cells in plant optimisation*, XX ciclo (*supervisor* with Elisabetta Arato);

Co-supervisor of the following Ph.D. students at Facoltà di Scienze e Tecnologie della Libera Università di Bolzano (*co-supervisor* with Marco Baratieri, *supervisor* Elisabetta Arato):

- Filippo Marchelli, *Processes for Biomass Valorisation*, XXXII ciclo;

- Dario Bove, *Investigation on the biomass gasification in a spouted bed reactor pilot plant*, XXIX ciclo.

Responsible of the following contracted researchers at UNIGE:

- Dario Bove, Detailed simulation of molten carbonate fuel cells, 2018-2020;

- Massimo Curti, Valorisation of food and textile waste for the bio-char production, 2018;

- Max Romero Rivas, Sustainable and innovative processes for energy

production from biomasses, 2012.

PhD committees membership

- Civil, Chemical and Environmental Engineering, University of Genoa, 2013-today.

- Fluid-dynamics and Processes of Environmental Engineering, University of Genoa, 2013-2016.

Research interests

My main research activity is focused on the development of fuel cells for the clean production of energy and electrolyzers for the hydrogen production.

At the same time, I deal with associated research topics concerning carbon capture and transport, water and gas treatment, thermochemical processes like gasification and pyrolysis, re-use of agricultural, municipal and industrial waste.

Key qualifications:

- detailed simulation of chemical and electrochemical monolithic reactors
- solution of problems related to equipment scale-up
- theoretical and experimental analysis of transport phenomena in porous catalysts
- steady-state and dynamic simulation of process plants
- definition and execution of procedures for testing in laboratories or pilot-plants
- experimental data analyses and estimation of kinetic and thermodynamic non-linear parameters
- computer programming

Grants

2018 - ONGOING

AD ASTRA - HArnessing Degradation mechanisms to prescribe Accelerated Stress Tests for the Realization of lifetime prediction Algorithms

European Union

Principal investigator

The overall objective of AD ASTRA is the development of Accelerated Stress Test (AST) protocols that allow quantitative identification and prediction of critical degradation mechanisms, correlating them with overall performance variables in selected SOFC stack components (seal, anode and interconnect).

Project partners: ENEA, Commissariat à l'Énergie Atomique et aux Energies Alternatives (CEA), Danmarks Tekniske Universitet (DTU), Elring Klinger, École Polytechnique Federale de Lausanne (EPFL), Institute of

Electrochemistry and Energy Systems (Bilgaria, IEES), HTceramix SA,
University of Salerno, University of Genoa
(Responsable for UNIGE: DCCI department)

2017 - ONGOING

Investigation of the phenomena occurring in Molten Carbonate Fuel Cells (MCFCs)

Exxon Mobil Research and Engineering - US - US

Principal investigator

The project deals with the study of the phenomena which characterize the behavior of molten carbonate fuel cells; the planning of experimental campaigns devoted to a better understanding of the reaction mechanisms; the detailed simulation of performance and the proposal of optimized solutions

2017 - ONGOING

LIBERNITRATE

European Commission

Participant

Project aimed at using silica filters obtained from the ashes of rice straw combustion in order to reduce the concentration of nitrates in the water cycle.

2018 - 2020

BioChar

bando Por Fesr 2014-2020 - Asse 1 - azione 1.2.4 - FILIDEA srl AGRINDUSTRIA
TECCO srl ETG Risorse e Tecnologie srl - IT - IT

Principal investigator

Simulation of an innovative reactor for the production of biochar and syngas from agricultural and textile waste

2017 - 2018

Peter on Board

Ministero delle Infrastrutture e dei Trasporti - IT - IT

Participant

Waste treatment on board of cruise ships to reduce environmental impact

2010 - 2014

CONTEX - MCFC catalyst and stack component degradation and lifetime Fuel Gas CONTaminant effects and EXtraction strategies

European Union

Participant

Objective of the project: to study the degradation mechanisms of fuel cells due to the presence of pollutants in the fuels supplied, to identify the tolerance limits in relation to these pollutants, to propose consequently adequate fuel clean-up solutions.

Project partners: ENEA, MTU Onsite Energy GmbH, Ansaldo Fuel

Cells, Technische Universität München, Marmara Research Centre, Kungliga Tekniska Högskolan, Institute OVM-ICCPET, Directorate General Joint Research Centre - Institute for Energy, Università di Perugia, CETaqua Water Technology Centre (CET).

2012

Modelling of membranes for the CO₂ segregation from biogas

ENEA - Accordo di Programma Ministero dello Sviluppo Economico - IT Participant

Modelling of ceramic and polymer membranes

2006 - 2011

Study of molten carbonate fuel cell systems

Ansaldo Fuel Cells - IT

Participant

Various specialized scientific support projects for the study, experimentation and modeling of molten carbonate fuel cell systems.

2007 - 2009

BICEPS Biogas integrated concept a european Program for sustainability

European Union

Participant

Objective of the project: to demonstrate, also through the experimentation of 1 MW pilot plant, the possibility of effectively producing electricity, heat and cold using biogas-fueled molten carbonate fuel cells.

Project partners: Ansaldo Fuel Cells, Balke Duerr, CIMA-UNIGE, Turbec R&D, CESPAS, ASM Terni, E.ON Engineering, Slovak Agricultural University in Nitra, Fraunhofer Institute Umsicht, ZAE Bayern, Romanian Institut OVM-ICCPET.

2006 - 2009

Use of hydrogen produced by crude residues gasification for the production of electricity through fuel cells

Isab Energy Services (ERG) - IT

Participant

Feasibility analysis for the production of electricity through fuel cells fueled with hydrogen from the gasification of crude residues.

Study carried out in collaboration with other departments of the University of Genoa.

2007

Gas processing and cleaning

Ansaldo Recherche

Participant

The studied gas processing and cleaning system was a plant for the production of hydrogen with adequate purity for subsequent feeding to a polymer membrane fuel cell system; it consists of three main operations:

catalytic reforming reaction of methanol with steam and oxygen; catalytic shifting reaction of carbon monoxide to carbon dioxide; purification of the hydrogen produced by absorption of carbon dioxide in a monoethanolamine solution.

2006

Study of energy valorisation of agricultural biomass and agricultural resulting from purification of domestic and industrial waste water

Azienda Multiservizi Idrici ed Ambientali Scrivia (Amias) - IT

Participant

Feasibility analysis relating to the use, as a renewable source of energy, of sludge and biomass of forest origin, deriving from the cleaning of the territory, or purely agricultural, such as corn grain, to be exploited using traditional and non-traditional technologies.

2005

Optimization of seawater desalination plants

FISIA ITALIMPIANTI - IT

Participant

Simulation of a deaerator designed to remove oxygen from sea water in desalination plants, demonstrating the possibility of maintaining the required separation efficiency without feeding steam to the stripping section.

2003 - 2005

IRMATECH Integrated researches on materials technologies and processes to enhance MCFC in a sustainable development

European Union

Participant

Project objective: in relation to molten carbonate fuel cell systems, to reduce the costs of materials and production processes, to improve the plants in terms of compactness, to increase the life time and minimize the environmental impact.

Project partners: Ansaldo Fuel Cells, Fraunhofer Institute, Balcke Duerr, Tubitak – Marmara Research Centre, CNRS, ENEA, Süd-Chemie AG, CSIC, KTH, KTI/TECNIP, BP Exploration Operating Limited, KRUPP VDM, CESI, ENITECNOLOGIE, Rich Müller, EPS - Microturbines