



ELISABETTA ARATO

CURRENT SITUATION

Full Professor of Chemical Engineering Fundamentals in the Department of Civil, Chemical and Environmental Engineering, (DICCA) of the University of Genoa.

Since May 2019 current president of the non-profit consortium company Innovative Technologies for Environmental Control and Sustainable Development – TICASS srl which includes 47 SMEs, large enterprises and research centers, including the University of Genoa. TICASS is also the managing body of the Ligurian Regional Research and Innovation Center on Energy, Environment, Sustainable Development EASS (about 100 enterprises in the energy sector).

In TICASS, role of scientific and training contact in the company's areas of expertise and actively participant in the EU-funded projects of which TICASS is a partner:

- Horizon 2020 Bio-Plastics Europe project: Development and implementation of sustainable solutions for the production and use of bioplastics to protect the environmental quality of the sea and land, for which I am the scientific responsible for the entire project.
- Horizon 2020 EcoFISHent project: Demonstrable and replicable cluster to implement systemic solutions through multi-level circular value chains for the eco-efficient valorisation of fishing and fishing industry waste.
- Horizon EU Trineflex project: Transformation of industrial processes with high energy consumption through the integration of energy flexibility, processes and raw materials.
- PRISMAMED 2 (Interreg Italy-France Maritime): project having as its objective the creation of new production chains, with an innovative character and in view of circular economy.

For the University of Genoa I am currently coordinator of:

- PRIN 2022 Carnot project: *deCarbonized And ciRcular hydrogeN prOduction Through biomass and waste gasification* (2023-2025 and partner: Free Bozen University);
- UNIGE unit of *the Bioeconomy-Circular Economy Project. Technical-environmental study for the recovery and valorization of organic waste otherwise destined for landfill or energy recovery*, funded by the Liguria Region (2024-2026 coordinated by Italiana Coke).

RESPONSIBLE OF INDUSTRIAL PROJECTS:

- 2006 SOL: Research and design for Engineering package for the feasibility study of the purification line and recovery of H₂ and CO₂ from syngas from PRODE Project BICOCCA central;
- 2007-2009 Isaab Energy ERG Group: Utilisation of hydrogen produced by refinery-waste gasification for energy production by fuel cell systems;

- 2010 AROS: Environmental due diligence;
- 2016 Paul Wurth Italia S.p.a.: Valutazione della soluzione H2GREEN per l'idrolisi dell'acqua e la relativa produzione di idrogeno proposta da H2WIN;
- 2016 Paul Wurth Italia S.p.a.: Analisi di fattibilità di processo per lo sviluppo di tecnologie per l'eliminazione selettiva di cianuri da gas AFO;
- 2017 Exxon Mobil Research & Engineering – New Jersey USA: Consulting services to evaluate ExxonMobil data and develop research proposal to create electrochemical model that explains the data;
- 2019 Paul Wurth Italia S.p.a.: Software code adaptation from existing BF kinetic model to DR shaft process simulation.
- 2024 Reimex Group: Biozero project on the waste treatment for green hydrogen production in a circular economy framework.

Responsible of the Erasmus+ Programme of the Chemical Engineering Degree courses for student exchange with other E.U. universities (Sigma Clermont, France; Karlsruhe and Dortmund Universities, Germany; Cadiz, Sevilla, Valencia, Zaragoza Universities Spain; Aberdeen University, UK).

Responsible of the agreement and student exchange with Tokyo Institute of Technology, Tokyo (Japan)

Member of the Doctoral Committee in Sustainable Energy and Technologies of the Free University of Bolzano and of the College of the Doctoral School of Civil, Chemical and Environmental Engineering of University of Genoa.

MAIN INTERNATIONAL COLLABORATIONS:

Science Tokyo (formerly Tokyo Institute of Technology TIT) – Japan; University of Aberdeen - UK; Universidad Politecnica de Valencia – Spain; Universidad de Valencia – Spain.

PATENTS:

Co-author International patent of Ansaldo Fuel Cells "Method and System of Operating Molten Carbonate Fuel Cell" EP1834371B1, 13/07/2006

Co-author patent Italy-Spain "Process for adsorbing nitrates by means of active modified silica, from rice straw ash" S/Ref.: 19654-2017, N/Ref.: 2018_22

RESEARCH ACTIVITY

The research activity was initially focused on traditional topics of process engineering, such as the fluid-dynamics of metallurgic reactors, simulation of traditional facilities, data analysis and parameter estimation. Then, my study has been concerned with new and technologically relevant subjects in process engineering:

- **energy valorisation of different biomasses and waste:**

study and simulation of thermal conversion of renewable resources;

study of electrical plants fed with biomass-derived gas;

simulation of pyrolytic and gasification processes at different degrees of detail, from thermochemical analysis and local fluidynamics inside the gasifier to the plant analysis by using proprietary codes or commercial software;

spouted bed reactor simulation;

with the Politecnico of Turin set up of a 20kWth spouted bed pilot reactor for thermal tests on different wastes (shrubs, rice straw, textile residues, ...) in order to optimize the conversion yield and individuate the optimal operating range;

in co-operation with the Politecnico of Turin scale up of a spouted bed of 0.8 MWth and preliminary test analysis;
study of the recovery and use of gasification residues and of syngas produced;
pyro-gasification of non-recyclable plastic waste to produce liquid fuel.

- **simulation of fuel cell systems for the production of energy**

- **study of oxygen transport mechanisms at the liquid-vapour interface of liquid metals of technological interest in a vacuum or controlled atmosphere**

Responsible for more of 130 research projects of degree of students and for the research work of 14 doctoral students and 19 contract researchers.

BIBLIOMETRIC INDICATORS (Scopus, 1st September 2025):

total number of publications in peer-review journals 139

total number of citations 2363

H index 27

Researcher unique identifier: ORCID 0000-0002-0481-2175

RELEVANT ELEMENTS OF THE PAST

EDUCATION AND ACADEMIC EXPERIENCE

- November 1982: Master's Degree in Chemical Engineering from the Faculty of Engineering, University of Genoa;
- July 1987: PhD in Chemical Engineering (Universities of Turin, Milan and Genoa);
- March 1990 - October 1992: Researcher , Faculty of Engineering, University of Genoa;
- November 1992 – November 2019: Associate Professor of Chemical Engineering Fundamentals of the University of Genoa;
- Since December 2019 Full Professor of Chemical Engineering Fundamentals of the University of Genoa.

INSTITUTIONAL RESPONSIBILITIES:

- Since 1996, member of the Teaching Committee of the Department of Chemical Engineering;
- 1998-2003 Member of the Orientation and Tutorial Committee of the Faculty of Engineering;
- 2002-2006 Deputy Director of the Department of Environmental Engineering (DIAM);
- 2007-2014 Member of the Joint Committee of the Faculty of Engineering (later Polytechnic School);
- 2010-2012 Member of the Council of the Department of Civil, Environmental and Land Use Engineering (DICAT);
- 2012 – 2018 Member of the Council of the Department of Civil, Chemical and Environmental Engineering (DICCA);
- 2012-2013 Member of the Research Committee of DICCA;
- 2014 - 2017 Chairman of the Research Committee of DICCA;
- 2016 - 2019 coordinator of the Bachelor's and Master's programs in Chemical and Process Engineering,
- Since AY 2018/19 referee for the awarding of the double degree of Master in Chemical and Process Engineering of the University of Valencia (Spain) and Master in Chemical and Process Engineering of the University of Genoa (Italy).
- since 2019 Member of the Quality Commission of the Bachelor of Science in Chemical and Process Engineering.

Genova, September 2025

Mirabelle Arato