

Curriculum Antonello Barresi

Antonello Barresi after the degree cum laude in Chemical Engineering, got a PhD degree in 1990 in Chemical Engineering from the Politecnico di Torino working on thermal and catalytic combustion of waste gases; as Visiting Fellow worked on stabilised combustion with prof. Lisa D. Pfefferle at the High Temperature Reaction Laboratory of Yale University (Connecticut, USA). Since 1989 he was assistant professor, associate professor since 1998 and currently is full professor of Transport phenomena at Politecnico di Torino (appointed in 2005).

In 1992-93 took service at the University of Addis Abeba (Ethiopia) as expert in the field of Chemical Engineering for the Italian Foreign Office-Direction for Cooperation and Development.

As enseignant invité took service in Lyon-1 University for one month respectively in 1999/2000 and 2002-2003.

He gave the following course at Politecnico di Torino: Reactive systems for micro- and nanotechnologies, Theory of chemical processes development, Fundamentals of chemical processes development, Process design and industrial experimentation, Analysis and simulation of chemical processes, Dynamics and control of chemical processes, Fundamentals of environmental chemical engineering, Chemical engineering laboratory, Industrial catalysis.

Member of the board of teachers in the PhD program in "Chemical engineering". He gave the course for PhD on "Turbulent reacting flows" and organised in 1994 for the National PhD School in Chemical Engineering the course on "Modelling of chemical reactors".

Member of the editorial board of Pharmaceutics (MDPI); associate editor for Computational Methods in Chemical Engineering (Frontiers in Chemical Engineering) and member of the International Editorial Advisory Board of Drying Technology. He is in the board of referee for the following journals: Chemical Engineering Science, A.I.Ch.E. J., Industrial & Engineering Chemistry Research, Chemical Engineering and Processing, Canadian Journal of Chemical Engineering, Applied Catalysis B: Environmental, Biotechnology and Bioengineering, Powder Technology, Separation Science & Technology, Molecules.

His research activity (both experimental and modelling) was carried out on the following topics:

- modelling of processes and apparatus typical of chemical engineering, using both deterministic and stochastic models.
- mixing in multiphase systems: hydrodynamics of solid-liquid systems in stirred apparatus, mixing of granular solids
- investigation and modelling of turbulent reacting flows, and synthesis of nanostructured ceramic materials: development of new micromixing models, coupling of sub-grid models in CFD codes; experimental investigation of interaction between fast reactions and hydrodynamics both in homogeneous systems and in case of formation of a new phase (precipitation), also with variable rheology. Methods for the solution of population balances, and their coupling with CFD codes. Development of crystallisation, precipitation and flame synthesis processes. Process scale-up.
- catalytic combustion of waste gases and modelling of heterogeneous catalytic reactors: investigation of the mixture effects in the catalytic destruction of organic waste gases, and study of catalytic combustion with dynamic techniques; evaluation of the transport coefficients in the monolithic reactors; study of perovskite-type catalysts for low temperature destruction of chlorinated wastes. Development of innovative technologies: thermally stabilised catalytic combustors for the destruction of organic chlorinated wastes; forced unsteady state catalytic combustors for the destruction of lean and extra-lean waste gases.
- dynamics and control of forced unsteady-state reactors: feasibility of the reverse-flow reactor and of the simulated-moving-bed (or ring-reactor network) for synthesis reactions and for the NO_x abatement; investigation of the reactor dynamic behaviour and of possible control systems.

In the last period he was mainly involved in development of biomedical applications, and in particular in applying the "Quality by Design" concept in the field of pharmaceutical industry. The main research topics include:

- biomedical nanotechnologies: preparation and testing of active polymeric nanoparticles with modified surface to be used for tumour local therapy and diagnosis; controlled release of drugs.
- purification of pharmaceutical downstreams by liquid chromatography
- drying and freeze-drying: drying of pharmaceutical carriers at low temperature, freeze-drying process optimisation, in particular for pharmaceutical proteins. Development of new monitoring and control systems.

He has been responsible for the local operative unit in the previous PRIN programs (1999, 2001 and 2003 calls). Participated to research projects funded by European Union in the III, IV and V Framework programmes. In the V FP he has been responsible per the POLITO operative Unit in the project Lyo-Pro (Optimisation and control of the freeze drying of pharmaceutical proteins, contract N° G1RD-CT-2002-00736), with a financial contribution from EU of 375000 Euro; in this project, coordinated by Politecnico di Torino, participated to the general management of the project. He has been responsible of several bilateral projects (Italy-Spain, Italy-Belgium), in project founded by the region of Piemonte, and in training projects supported by EU (Marie Curie Training Site, Marie Curie Training Network). Responsible for various industrial projects concerning freeze-drying apparatus and pharmaceutical processes.

Awards:

AFSIA Award for Excellence in Drying, delivered to outstanding scientists in the field of drying who have succeeded in transferring fundamental works to practical applications (21st International Drying Symposium, 2018).

2020-21 Arun S. Mujumdar Medal, in recognition of excellent and impactful contribution to drying R&D in addition to outstanding mentorship of researchers who are contributing to further significant drying research

Author of more than 300 papers (of which about 210 published on international Journals or books) and more than 100 Conference presentations.