

ROBERTO MATARRESE

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EDUCATION

2008-2011: Post Doc Position, Chemical Engineering, Politecnico di Milano, Italy

2005-2008: P.h.D., Industrial Chemistry and Chemical Engineering, Politecnico di Milano, Italy

2007: Ph.D. visiting scholar, Competence Centre for Catalysis (KCK), Chalmers University of Technology, Göteborg, Sweden

2004: Master Degree, Industrial Chemistry, Università degli Studi di Milano, Italy

CURRENT & PREVIOUS POSITIONS

2020-present: Associate Professor, Laboratory of Catalysis and Catalytic Processes (LCCP), Department of Energy, Politecnico di Milano, Milano, Italy

2011-2020: Assistant Professor, Department of Energy, Politecnico di Milano, Italy

TEACHING AND TUTORING ACTIVITIES

2019-present: “Fundamentals of Process Industry” at the Master degree in Safety and Prevention Engineering in the Process Industry at Politecnico di Milano

2018-2019: “Fundamentals of Process Industry A+B” at the Master degree in Safety and Prevention Engineering in the Process Industry at Politecnico di Milano

2011-2018: “Fundamentals of Process Industry A” at the Master degree in Safety and Prevention Engineering in the Process Industry at Politecnico di Milano

2004-present: Co-Supervisor of more than 45 Master thesis students of Chemical Engineering, Energy Engineering, Materials Engineering and Nanotechnology, Environmental and Land Planning Engineering .

DESCRIPTION OF SCIENTIFIC ACTIVITY

Scientific activities can be framed in the field of heterogeneous catalysis and in particular catalytic processes of industrial interest, especially related to environmental protection and sustainable production of chemicals and energy.

The main research activities focused on:

- Selective oxidation of alcohols and glycols over innovative gold-based catalysts.
- Lean NO_x Trap (LNT) catalysts for NO_x abatement in mobile sources.
- Catalytic soot oxidation and combined soot-NO_x removal (diesel particulate-NO_x reduction (DPNR) technology).
- Hydrocarbon selective catalytic reduction of NO_x (HC-SCR) from lean-burn and diesel engines.
- Photo-electrochemical water splitting for hydrogen production over TiO₂-base nanostructured materials.
- CO₂ methanation.

He carried out his research activity by analyzing the catalytic processes dealing both with the synthesis and characterization of catalytic systems and with the evaluation of their catalytic behavior under reaction conditions.

In particular, he developed interdisciplinary skills and expertise in mechanistic investigations, aiming to clarify the relationships between the surface and structure properties of catalysts and their ability to guide chemical reactions along specific pathways. In order to study surface reactivity and reactions mechanisms,

he gained a consolidated experience in experiments under temperature programming (Temperature Desorption, TPD, and Temperature Programmed Surface Reaction, TPSR, experiments) and with concentration transients at constant temperature (Step Isothermal Concentration, ISC, experiments), also with isotopic labeling molecules, which allow the understanding of the nature and reactivity of superficial active species and the analysis of the dynamic reaction behavior, respectively.

He developed expertise also in the combined use transient microreactor experiments and *in-situ* or *operando* FT-IR spectroscopy to combine gas-phase data with surface species analysis which is a very demanding approach for the analysis of surface reactions, formation of intermediate species and reaction pathways.

He is co-responsible for the photocatalytic research lines, at Laboratory of Catalysis and Catalytic Processes, Politecnico di Milano, Italy

PUBLICATION RECORDS (updated June 2022)

Total Publications = 58 (ISI/SCOPUS indexed).

Scopus: h-index = 21, total citations = 1821

ISI Web of Science: h-index = 20, total citations = 1688

He is author or co-author of more than 80 communications to international conferences.

MAIN ACADEMIC COLABORATIONS

Prof. Marco Daturi, ENSICAEN, Université de Caen, CNRS, France

Prof. Giovanna Ghiotti and Dr. Sara Morandi, University of Torino, Italy

Prof. Avelina García García, University of Alicante, Spain

Prof. Stanislaw Dzwigaj, Université Pierre et Marie Curie, Paris, France

Prof. Alessandro Trovarelli, University of Udine, Italy

Prof. Jordi Llorca, Universitat Politècnica de Catalunya, Barcelona, Spain

Prof. Guido Busca, University of Genova, Italy

Prof. Magnus Skoglundh and Prof. Hanna Härelind, Chalmers University of Technology, Göteborg, Sweden

Prof. Michele Rossi, University of Milano, Italy

PARTECIPATION TO PROJECTS

2013-2016: Basic Research Investment Fund (FIRB) project (call 2012), founded by MIUR (Italian Ministry of Education, Universities and Research). Coordinator: Prof. Bensaïd Samir (Politecnico di Torino, Italy)

2011-2014: FARB (University Funds for Basic Research) project founded by Politecnico di Milano.

Coordinator: Prof. Isabella Nova (Politecnico di Milano, Italy)

2010-2012: Italy-Spain Integrated Actions project (call 2009), founded by MIUR (Italian Ministry of Education, Universities and Research). Coordinators: Prof. Luca Lietti (Politecnico di Milano, Italy) and Prof. Lius J. Alemany, (University of Malaga, Spain).

2008-2010: Research Project of National interest (PRIN) project (call 2007) founded by MIUR (Italian Ministry of Education, Universities and Research). Coordinator: Prof. Paolo Ciambelli, University of Salerno, Italy.

2004-2006: European project Auricat founded by UE. European Institution Coordinator: University of Wales, Cardiff, UK. Italian Coordinator: Prof. Michele Rossi (University of Milano)

INDUSTRIAL COLLABORATIONS

2016-2020: Partner: Johnson Matthey, UK; Project leader: Prof. Alessandra Beretta (Politecnico di Milano, Italy)

2016-2017: Partner: Toyota Motor Europe (TME), Bruxelles, Belgium; Project leader: Prof. Luca Lietti (Politecnico di Milano, Italy).

2011: Partner: Chemtex (Mossi Ghisolfi Group), Italy; Project leader: Prof. Luca Lietti (Politecnico di Milano, Italy).

2008-2009: Partner: Corning Incorporated, New York, US; Project leader: Prof. Luca Lietti (Politecnico di Milano, Italy).

EDITORIAL ACTIVITY

Referee for international ISI/SCOPUS indexed journals such as Applied Catalysis B:Environmental (Elsevier), Chemical Engineering Journal (Elsevier), Catalysis Today (Elsevier), Catalysis Communications (Elsevier), Applied Surface Science (Elsevier), Journal of Industrial and Engineering Chemistry (Elsevier), Chemical Physics Letters (Elsevier), Molecular Catalysis (Elsevier), Vacuum (Elsevier)

Editorial Board member of:

- Chemical Papers (Springer Nature, ISSN: 0366-6352)
- Scientific Reports (Springer Nature, ISSN: 2045-2322)
- Journal of Engineering (Hindawi, ISSN: 2314-4904)

CONFERENCE ORGANIZATION

Member of the Organizing Committee of the XX CONGRESSO NAZIONALE DI CATALISI - XX CONGRESSO NAZIONALE DELLA DIVISIONE DI CHIMICA INDUSTRIALE (GIC-DICHIN2018), September 2018, Milano, Italy

MEMBERSHIPS

IDECAT (Integrated DDesign of CATalytic nanomaterials for sustainable Production) European Network of Excellence.

INSTM: National Interuniversity Consortium of Materials Science and Technology