

Curriculum Vitae et Studiorum

ALESSANDRO STAGNI

1. PERSONAL DATA

Name: Alessandro Stagni
Birth date: January 30, 1988
Birth place: Trani (BT), Italy
Work address: Department of Chemistry, Materials and Chemical Engineering "G. Natta", Politecnico di Milano, Piazza Leonardo Da Vinci 32, 20133 Milano (MI)
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2. CURRENT POSITION

2024-Present

Associate Professor at Politecnico di Milano

Department of Chemistry, Materials and Chemical Engineering "G. Natta"

Settore scientifico disciplinare: ING-IND/25 Impianti chimici

Settore concorsuale: 09/D3 – Impianti e processi industriali chimici

3. EDUCATION

2012-2016

Ph.D. *cum laude* in Industrial Chemistry and Chemical Engineering at Politecnico di Milano

Date: July 12, 2016.

Thesis title: "Implementation of detailed chemistry in large-scale combustion computations"

Supervisor: Prof. Tiziano Faravelli.

2009-2011

Master of Science in Chemical Engineering at Politecnico di Milano

Graduation date: October 4, 2011.

Final grade: 110/110 *cum laude*.

Thesis title: “Metodi numerici di calcolo parallelo per la soluzione di reti di reattori”.

Supervisor: Prof. Tiziano Faravelli.

2006-2009

Bachelor of Science in Chemical Engineering at Politecnico di Milano

Graduation date: July 22 2009

Final grade: 110/110 *cum laude*.

Thesis title: “Modellazione di un impianto IGCC”

Supervisors: Prof. Tiziano Faravelli, Ing. Luca Mancuso (Foster Wheeler Italiana).

2001-2006

Diploma di Maturità Scientifica at Liceo Scientifico Statale “C. Cafiero” – Barletta

Final grade: 100/100.

4. RESEARCH EXPERIENCE

2021-2024

Ricercatore a tempo determinato - tempo pieno - art. 24 c.3-b L. 240/10 (RTDB) at Politecnico di Milano

Department of Chemistry, Materials and Chemical Engineering “G. Natta”

Settore scientifico disciplinare: ING-IND/25 Impianti chimici

Settore concorsuale: 09/D3 – Impianti e processi industriali chimici

2020

Abilitazione Scientifica Nazionale a professore di I fascia

Settore concorsuale 09/D3 – Impianti e processi industriali chimici

Settore concorsuale 09/D2 – Sistemi, metodi e tecnologie dell’ingegneria chimica e di processo

2017-2021

Ricercatore a tempo determinato - tempo pieno - art. 24 c.3-a L. 240/10 (RTDA) at Politecnico di Milano

Department of Chemistry, Materials and Chemical Engineering “G. Natta”

Settore scientifico disciplinare: ING-IND/25 Impianti chimici

Settore concorsuale: 09/D3 – Impianti e processi industriali chimici

Research project: Detailed and reduced kinetic mechanisms, and their validation

2016-2017

Post-doctoral fellow at Politecnico di Milano

Department of Chemistry, Materials and Chemical Engineering “G. Natta”

Research project: Modeling the evaporation and combustion of bio-oil droplets obtained from biomass fast pyrolysis

2012

Post-graduate researcher at Politecnico di Milano

Department of Chemistry, Materials and Chemical Engineering “G. Natta”

Research project: Development of parallel computing techniques for reacting flows with detailed kinetics

5. RESEARCH AT ABROAD INSTITUTIONS

November 2019 – February 2020

Visiting Researcher at the “Simulation of reactive Thermo-Fluid Systems” (STFS) group, Technische Universität Darmstadt

Host: Prof. Christian Hasse

February 2015 – November 2015

Visiting PhD Student at Center for Turbulence Research, Stanford University

Host: Prof. Matthias Ihme

6. TEACHING ACTIVITIES

2024-Present: Lecturer of “*Data Science in chemical Engineering*” at Politecnico di Milano

Master of Science in Chemical Engineering/Ingegneria Chimica. 5 CFU.

2022-Present: Lecturer of “*Sperimentazione Industriale*” (Experimental measures) at Politecnico di Milano

Bachelor of Science in Chemical Engineering/Ingegneria Chimica. 5 CFU.

2022-2024: Lecturer of “*Laboratorio Progettuale di Ingegneria Chimica*” (Chemical Engineering Project Lab) at Politecnico di Milano

Bachelor of Science in Chemical Engineering/Ingegneria Chimica. 5 CFU.

2018-2024: Lecturer of “*Impianti Chimici*” (Chemical Plants) at Politecnico di Milano

Master of Science in Energy Engineering/Ingegneria Energetica. 5 CFU.

2014-2017: Teaching assistant of “*Chemical Reaction Engineering*” at Politecnico di Milano

Master of Science in Chemical Engineering/Ingegneria Chimica. 5 CFU.

2012-2014: Teaching assistant of “*Ingegneria delle Reazioni Chimiche*” at Politecnico di Milano

Master of Science in Ingegneria Chimica. 5 CFU.

7. SUPERVISION OF STUDENTS

2013-Present:

Supervisor of 3 PhD Students in Industrial Chemistry and Chemical Engineering at Politecnico di Milano

Supervisor of 12 MSc Students in Chemical Engineering at Politecnico di Milano

Co-supervisor of 4 MSc Students in Chemical Engineering/Ingegneria Chimica at Politecnico di Milano

Supervisor of 9 BSc students in Ingegneria Chimica at Politecnico di Milano

8. SCIENTIFIC SERVICES

a) Organization of conferences:

April 2018:

Member of the organizing committee of the workshop "Gas-phase Reaction Kinetics of Biofuels Oxygenated Molecules" 23-24 April 2018 – Milano, sponsored by the H2020 IMPROOF (G.A. 723706) project, and by SMARTCATS COST Action CM1404 "Chemistry of Smart Energy Carriers and technologies"

b) Reviewer of the following scientific journals:

CEAS Space Journal, Chemical Engineering Research and Design, Chemical Papers, Combustion and Flame, Combustion Theory and Modeling, Energy, Energy and fuels, Experimental Thermal and Fluid Science, Frontiers in Energy Research, Fuel, International Journal of Chemical Kinetics, International Journal of Hydrogen Energy, Proceedings of the Combustion Institute

c) Reviewer of the following foundations/agencies:

- American Chemical Society – Petroleum Research Fund
- Israel Science Foundation

d) 2020-2024: Member of the PhD defense committees of 4 students at international institutions (Belgium, Italy, Australia, France)

9. SCIENTIFIC INTERESTS

My research activity is focused on the kinetic analysis of reacting flows of fossil and renewable hydrocarbons. This is performed at different levels, i.e. development and reduction of kinetic mechanisms, and application in computational fluid dynamics (CFD). The expertise that I gained during my academic career covers pyrolysis and oxidation of fossil fuels and surrogates, mechanisms of formation of pollutant species (NO_x , SO_x), at a fundamental level as well as at real scales (turbulent combustion devices, e.g. furnaces and engines). In the current energy scenario, my research has recently expanded to the use of *carbon-free* energy vectors, e.g. ammonia, for the *on demand* release of energy via direct combustion or mixed with conventional fuels. In particular, my research covers the following areas:

- i. Combustion instabilities
 - ii. Detailed kinetic mechanisms of pollutants formation (NO_x , SO_x , soot...)
 - iii. Chemistry of energy carriers
 - iv. Analysis and reduction of kinetic mechanisms
 - v. Reactor network analysis
 - vi. Near-wall flame quenching
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10. MAJOR SCIENTIFIC COLLABORATIONS

- *Prof. Paul Medwell and Dr. Michael Evans* – University of Adelaide, Australia – Topic: “Numerical modeling of non-premixed MILD flames” (3 joint papers published)
 - *Dr Benedetta Franzelli* – CentraleSupélec - Université Paris-Saclay – Topic: “Numerical modeling of soot formation through detailed kinetics” (1 joint paper published)
 - *Prof. Matthias Ihme* – Stanford University – Topic: “Numerical modeling of the autoignition of multicomponent fuel droplets” (3 joint papers published)
 - *Prof. Kalyanasundaram Seshadri* – University of California at San Diego – Topic: “Numerical modeling of the autoignition of condensed-phase hydrocarbons” (2 joint papers published)
 - *Dr Frédérique Battin-Leclerc & Prof. Olivier Herbinet* – CNRS-Université de Lorraine – Topic: “Modeling of biofuel, bio-oil and ammonia combustion in ideal reactors” (5 joint papers published)
 - *Dr Mariarosaria de Joannon* – Istituto di Ricerche sulla Combustione, Consiglio Nazionale delle Ricerche – Topic: “Numerical modeling of the oscillating combustion of hydrocarbons in ideal reactors” (1 joint paper published)
 - *Dr. Oliver Stein* – Institut für Technische Verbrennung, Universität Stuttgart – Topic: “Detailed numerical simulations of the combustion of coal particles via detailed kinetics” (1 joint paper published)
 - *Prof. Alessandro Parente* – Université Libre de Bruxelles – Topic: “Application of *adaptive chemistry* in CFD simulations” (3 joint papers published)
 - *Prof. Christian Hasse* – Technische Universität Darmstadt – Topic: “CFD simulations of reacting flows via reduced kinetic mechanisms” (2 joint papers published)
 - *Prof. Katharina Kohse-Höinghaus* – Bielefeld University, Germany – Topic: “Experimental activity and kinetic modeling of dimethyl ether and dimethoxymethane oxidation, and related interaction with nitrogen oxides” (2 joint papers published)
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11. PARTICIPATION TO RESEARCH PROJECTS

2020-Present

“Enhancing the combustion characteristics of heavy fuel oil emulsions via ultrasonically-induced cavitation”, Saudi Arabia Competitive Research Grant (CRG) framework (USD 263k)

2017-2020

IMPROOF (Integrated model guided process optimization of steam cracking furnaces, H2020 European Project [ID No. 723706] (EUR 514k)

2016-2017

Residue2Heat (Renewable residential heating with fast pyrolysis bio-oil), H2020 European Project [ID No. 654650] (EUR 330k)

2016-2019

SMARTCATs COST ACTION CM1404. *Chemistry of Smart Energy Carriers and Technologies*.

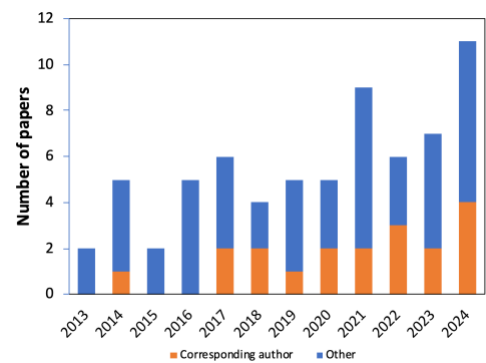
2023-Present

CYPHER COST ACTION CA22151. *Cyber-Physical systems and digital twins for the decarbonisation of energy-intensive industries*.

12. BIBLIOMETRY

Author of 69 publications on scientific international peer-reviewed journals, or book chapters:

- 18 as first author
- 20 as corresponding author
- 23 without PhD supervisor
- Full list available in [Scopus](#)



Bibliometric indices (December 2024)

- Academic age: 11 (first paper published in 2013)
- H-index: 26 (Scopus) 24 (WoS)
- Total Citations: 2729 (Scopus) 2441 (WoS)
- Total Publications: 69 (Scopus) 58 (WoS)

13. INVITED LECTURES

- Invited speaker at the 3rd Symposium on Ammonia Energy, Shanghai, 22nd-26th September 2024, China.
- Lecturer at the International Combustion Institute Summer School “Near-wall Reactive Flows”, 10th-13th June, Darmstadt, Germany.
- Invited speaker at the KAUST Research Conference “AI for Energy”, 6th-8th March 2023, Thuwal, Saudi Arabia.
- Invited speaker at the KAUST Research Conference “Near Zero-Carbon Combustion Technology”, 21st-23rd June 2021, Thuwal, Saudi Arabia

Milano, December 20, 2024

Alessandro Stagni