Riccardo Caraccio

Contact Information

Piazza L. Da Vinci 32 Milano
Politecnico di Milano
20133 Milano (MI), Italy

Email: riccardo.caraccio@polimi.it

Experiences

Graduate researcher, *Politecnico di Milano, Milano, Italy* **Nov. 2023-present**

Advised by Prof. Tiziano Faravelli and Prof. Matteo Pelucchi, working on the development of a CFD model for particle-scale biomass pyrolysis and combustion.

Visiting student, *La Sapienza University, Rome, Italy* **Mar. 2023-May. 2023**

Visiting student at La Sapienza University's chemical engineering laboratories, under the guidance of Prof. Benedetta Decaprariis while working on my M.Sc. thesis on the pyrolysis of polyethylene.

Education

Ph.D., Chemical Engineering, *Politecnico di Milano, Milano, Italy* **2023-present**

Dissertation Advisors: Prof. Tiziano Faravelli and Prof. Matteo Pelucchi

M.Sc., Chemical Engineering, *Politecnico di Milano, Milano, Italy* **2021-2023**

Thesis Title: "*Experimental and kinetic modeling study of secondary gas-phase reactions in solid plastic waste pyrolysis*" (link).

Thesis Advisors: Prof. Matteo Pelucchi, Prof. Benedetta Decaprariis and Dr. Andrea Locaspi.

B.Sc., Chemical Engineering, *Politecnico di Milano, Milano, Italy* **2018-2021**

Thesis Title: "*Comparison of experimental and EoS-calculated liquid-solid equilibrium temperatures in LNG.*".

Thesis Advisor: Prof. Renato Rota.

Research Interests

I am a second-year Ph.D. student at Politecnico di Milano, affiliated with the Department of Chemistry, Materials, and Chemical Engineering "Giulio Natta". My research is conducted within the CRECK Modeling Laboratory, under the supervision of Professor Tiziano Faravelli and Professor Matteo Pelucchi. My primary research focus is on developing a particle-scale CFD model for the pyrolysis and combustion of biomass and porous media in a broader sense. Additionally, I am involved in the development of solid-phase kinetic mechanisms.

Publications

† Denotes equal contribution. * Denotes corresponding author.

Submitted Publications

1. Million M. Afessa, Andrea Locaspi, Paulo Debiagi, Alessio Frassoldati, **Caraccio Riccardo**, A.Venkata Ramayya, and Tiziano Faravelli. "Pyrolysis of large biomass particles: model validation and application to Coffee Husks valorization". In: *Journal of Analytical and Applied Pyrolysis* (2024).

Conferences and Presentations

Conferences

2. 12th International Freiberg Conference on Circular Carbon Technologies, Shanghai, China. Oral contribution, "*CHAR:ME: biochar and biomass-derived waste products as sustainable and safe domestic fuel*". **Caraccio R.**, Afessa M. M., Scialabba A., Signori L., Caregnato D., Della Toffola D., Ferrato C., Faravelli T., Bracconi M., Turolla A., Pelucchi M. 23-26 September 2024

1. 46th Meeting of the Italian Section of The Combustion Institute, Bari, Italy. Oral contribution, "*CHAR:ME: biochar and biomass-derived waste products as sustainable and safe domestic fuel*". **Caraccio R.**, Afessa M. M., Scialabba A., Signori L., Caregnato D., Della Toffola D., Ferrato C., Faravelli T., Bracconi M., Turolla A., Pelucchi M. 02-05 June 2024

Schools

1. 2024 Princeton-Combustion Institute Summer School on Combustion and the Environment, Princeton NJ, USA. 16-21 June 2024

Teaching

Teacher assistant, *Politecnico di Milano*

Data Science in Chemical Engineering. Course given to graduate students in Chemical Engineering. Covering introductory data science theory, machine learning and neural networks topics. Sample code can be found on the GitHub repository (link). **A.Y. 23-24, 24-25.**

Tutor, *Politecnico di Milano*

Advanced Transport Phenomena. Support to students and additional lessons on MATLAB programming. **A.Y. 23-24, 24-25.**

Mentoring/Supervision

Master Students (Politecnico di Milano)

Frank Matteo Macaluso, co-supervised with Prof. Matteo Pelucchi. Thesis title: "Characterization and kinetic modelling study of biomass samples pyrolysis in the context of CHAR:ME Polisocial Project" (link).

Computer Skills

Languages— Proficient in:

- C/C++, Python, MATLAB (main programming languages)
- LaTeX, Markdown (markup languages)

Software— I have extensive experience in developing and maintaining scientific computing software across multiple domains. As an active contributor to OpenSMOKE++, I've specialized in implementing solid-phase chemistry core functionalities. My work includes developing and maintaining both 0-D and 1-D solvers that integrate with OpenSMOKE++ for solid-phase systems analysis. I have worked on the development of solid-phase reaction kinetic mechanisms. Additionally, I have over a year of experience developing computational fluid dynamics (CFD) code using the Basilisk framework. Most of my contributions can be found on my GitHub profile at https://github.com/Riccaraccio.

Authorizations

1. Autorizzo al trattamento dati ai sensi del GDPR 2016/679 del 27 aprile 2016 (Regolamento Europeo relativo alla protezione delle persone fisiche per quanto riguarda il trattamento dei dati personali);

2. Autorizzo la pubblicazione del Curriculum Vitae sul sito istituzionale del Politecnico di Milano (sez. Amministrazione Trasparente) in ottemperanza al D. Lgs n. 33 del 14 marzo 2013 (e s.m.i.).