

ANDREA FACCHIN

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[Andrea Facchin](#) 
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OBJECTIVE

Develop novel routes to implement sustainable fuel and chemical production. Innovating the green transition, provide novel conversion pathways within a multidisciplinary approach.

Make a better future for the people I love and those I will.



EXPERIENCE

RAPCO2 sbri | Founder, CTO and Administration Board

2026 - Current

Type: Innovative start-up, Official Spin-off of University of Bologna

Role: Co-inventor of the RAPCO2 process (patented), Chief of technical office, Member of the Administration board

Activities: Direct air capture (DAC) of carbon dioxide (CO₂) indoor and outdoor and transformation through a hybrid thermochemical-biological path into drop-in chemicals and fuels.

Website: www.rapco2.com

Research fellowship | RECHEWS (Renewable Chemicals from Wastewater Treatment Sludge)

2024 - Current

Tutor: *Prof. Cristian Torri*

Activities: Development and optimization of a process to convert organic sludges into high-value chemicals.

Organization: University of Bologna



EDUCATION

PhD Future Earth, Climate change, and Societal Challenges | University of Bologna, Chemistry Department "G. Ciamician"

1 November 2021 - Current

Subject: Carbon negative strategies for CO₂ removal and chemical productions

Tutor: *Cristian Torri*

Main activity: The target of PhD is to provide a significant advancement in the development of new flexible hybrid thermochemical-biological approaches to convert waste biomass and carbon dioxide into carbon neutral and carbon negative chemicals. To this purpose, development/optimization of improved process for carbon dioxide capture and biological utilization will be integrated into new processes in which hydrothermal and dry pyrolysis will be coupled with “pyrotrophic” fermentation.

Green Chemistry Summer School | Green Science for Sustainable Development Foundation

4-10 July 2021, Online / Venice, Italy

Post-graduated summer school on green chemistry, in collaboration with PhosAgro, IUPAC, and Ca’Foscari University of Venice.

One week of conference, with international and prestigious guests, based on the Green Chemistry innovation and approach for the development of new solutions for a sustainable production and the preservation of the environment.

Master’s degree in Environmental Analysis and Management | University of Bologna

2018 –2021

Chemical and biological approach to the environment, management of the ecological aspects, waste management, and the use of biomass as a source of energy and material. For my thesis I had built a laboratory-scale thermochemical-biological process for the conversion of pyrolysis products derived from lignocellulosic biomasses, into VFA in combination with hydrogen (from water hydrolysis). All the system had digital controls, such as gas volumes, liquid recirculation, and temperature control, and all the inputs and outputs were chemically characterized to obtain a full controlled system for the mass and energy balance.

Average marks: 29.69 / 30

Degree score: 110 / 110 con Lode

Bachelor’s Degree in Environmental Science | University of Udine

2014 –2018

Study of the general biotic and abiotic aspects of the environment and general aspects of the management and economic studies of it.

My thesis was focused on the study of potentially toxic metals in the lagoon’s plants in Grado and Marano (supervisors: [Marco Contin](#), [Maria De Nobili](#), [Elisa Pellegrini](#)).

Average marks: 26.13 / 30

Degree score: 102 / 110

Diploma of Chemical Expert | ITS Kennedy (PN, Friuli Venezia-Giulia)

2009 –2014

Study of organic and inorganic chemistry and laboratory practice. I have done chemical, physical, mathematical, and problem-solving competitions. I had received a prize for the high marks. Final report on the metal concentration in a vegetal sample from a local industry zone.

Final score: 82/100



PUBLICATIONS (11)

Title: An original Arduino-controlled anaerobic bioreactor packed with biochar as a porous filter media.

Authors: Küçükağa, Y., Facchin, A., Torri, C. & Kara, S.

Journal: MethodsX 9, (2022).

DOI: <https://doi.org/10.1016/j.mex.2021.101615>

Title: Conversion of Pyrolysis Products into Volatile Fatty Acids with a Biochar-Packed Anaerobic Bioreactor

Authors: Yusuf Küçükağa, Andrea Facchin, Serdar Kara, Tülin Yılmaz Nayır, Daniel Scicchitano, Simone Rampelli, Marco Candela, and Cristian Torri

Journal: Industrial & Engineering Chemistry Research (2022)

DOI: <https://doi.org/10.1021/acs.iecr.2c02810>

Title: Could pyrolysis substitute hydrolysis in 2nd generation biomass valorization strategies? A chemical oxygen demand (COD) approach

Authors: Cristian Torri, Lorenzo Favaro, Andrea Facchin, Yusuf Küçükağa, Alessandro Girolamo Rombolà, Daniele Fabbri

Journal: Journal of Analytical and Applied Pyrolysis (2022)

DOI: <https://doi.org/10.1016/j.jaap.2022.105467>

Title: Analytical pyrolysis of polyethyleneimines

Authors: Irene Coralli, Daniele Fabbri, Andrea Facchin, Cristian Torri, Lee A. Stevens, Colin E. Snape

Journal: Journal of Analytical and Applied Pyrolysis (2023)

DOI: <https://doi.org/10.1016/j.jaap.2022.105838>

Title: Innovative char-sparger for improving volatile fatty acids (VFA) production in homoacetogenic fermentation of H₂/CO₂ with microbial mixed cultures (MMC)

Authors: Yusuf Küçükağa, Andrea Facchin, Vittoria Stefanelli, Federica Costantini, Serdar Kara, Cristian Torri

Journal: Chemical Engineering Journal (2023)

DOI: <https://doi.org/10.1016/j.cej.2023.144165>

Title: Development of a novel biochar-made porous monolith for enhanced C₁ and H₂ fermentation

Authors: Yusuf Küçükağa, Andrea Facchin, Aaron Alfonsi, Federica Costantini, Serdar Kara, Cristian Torri

Journal: MethodsX (2023)

DOI: <https://doi.org/10.1016/j.mex.2023.102296>

Title: Analytical evaluation of the coupling of hydrothermal carbonization and pyrolysis (HTC-Py) for the obtainment of bioavailable products

Authors: Andrea Facchin, Yusuf Küçükağa, Daniele Fabbri, Cristian Torri

Journal: Journal of Analytical and Applied Pyrolysis (2023)

DOI: <https://doi.org/10.1016/j.jaap.2023.106185>

Title: Changes of labile, stable and water-soluble fractions of biochar after two years in a vineyard soil

Authors: Alessandro G Rombolà, Nicolas Greggio, Daniele Fabbri, Andrea Facchin, Cristian Torri, Roberta Pulcher, Carlotta Carlini, Enrico Balugani, Diego Marazza, Denis Zannoni, Alessandro Buscaroli

Journal: Environmental Science: Advances (2023)

DOI: <https://doi.org/10.1039/D3VA00197K>

Title: Analytical evaluation of the performance of pyrolysis-gasification (Py-Gs) combination within hybrid thermochemical-biological biorefinery

Authors: Yusuf Küçükağa, Andrea Facchin, Serdar Kara, Cristian Torri

Journal: Journal of Analytical and Applied Pyrolysis

DOI: <https://doi.org/10.1016/j.jaap.2024.106544>

Title: Vacuum-enhanced stripping allows the extractive acidogenic fermentation at thermophilic conditions

Authors: Cristian Torri, Federica Zimbardi, Andrea Facchin

Journal: Chemical Engineering Journal

DOI: <https://doi.org/10.1016/j.cej.2025.168662>

Title: Analytical pyrolysis of fir sawdust, olive stone and sewage sludge in molten carbonate salts

Authors: Elahe Ahmadi, Irene Coralli, Cristian Torri, Andrea Facchin, Alessandro G. Rombolà, Martina Zangheri, Francesco Fantozzi, Haiping Yang, Shurong Wang, Daniele Fabbri

Journal: Journal of Analytical and Applied Pyrolysis

DOI: <https://doi.org/10.1016/j.jaap.2025.107144>



PROJECTS AND INTERNATIONAL MOBILITY

Research project | GREENHYDCM

2023 - Current

Project director: *Prof. Daniele Fabbri*

Activities: Development and study of an green hydrogen production system from pyrolysis of waste biomasses utilizing biochar-derived electrodes.

Partners: University of Bologna, University of Perugia (Italy), Zhejiang University (P.R. China), Huazhong University of Science and Technology (P.R. China)

SITE: <https://chimica.unibo.it/it/ricerca/progetti-di-ricerca/altri-progetti/greenhydcn>

Research project | RECHEWS

2022 - Current

Project director: *Prof. Cristian Torri*

Activities: Production of Polyhydroxyalkanoates for the obtainment of crotonic acid.

Partners: University of Bologna, University "Ca'Foscari", Venice (Italy)

PRIN22 Protocol N°: 2022KK2HTL

Abroad period | National school of Chemical Industries (ENSIC), Nancy (FR)

15 April - 15 October 2023 (6 months)

Tutor: *Prof. Anthony Dufour*

Host: University of Lorraine, Nancy, France

Activities: Development of a middle scale (10-100 g/h) fluidized bed pyrolyser. HTC of lignocellulosic biomass. Chemical characterization of obtained products with different chemical techniques (solid and liquid NMR, HRMS, GC-MS, HPLC-MS, TGA, TOC, CHNSO).



CONFERENCE PROCEEDINGS

Oral presentation | Pyroliq II, Calabria, Cetraro, Italy

14-19 September 2025

Title: The power of silylation: Toward a molecular description of liquids from pyrolysis and hydrothermal treatments

Authors: Cristian Torri, Andrea Facchin, Federica Zimbardi, Daniele Fabbri

Presenting Author: Cristian Torri

Poster presentation | American Association for Aerosol Research, AAAR 42th, Albuquerque, New Mexico, USA

21-25 October 2024

Title: Collection of condensed vapours from biomass slow pyrolysis process

Authors: Muhammad Wasiq Riaz, Andrea Facchin, Vincenzo Gentile, Cristian Torri, Paolo Tronville

Presenting Author: Muhammad Wasiq Riaz

Oral presentation | World Conference on Anaerobic Digestion, IWA18, Istanbul, Turkey

02-06 June 2024

Title: Vacuum-driven extractive fermentation of waste for chemical production

Authors: Andrea Facchin, Federica Zimbardi, Cristian Torri

Presenting Author: Andrea Facchin

Oral presentation | International Symposium on Analytical and applied Pyrolysis, Pyro24, Beijing, China

19-23 May 2024

Title: Effect of hydrothermal pretreatment on fluidized bed pyrolysis of wood

Authors: Andrea Facchin, Mohamed Aissaoui, Jasmine Hertzog, Marc Quinternet, Jésus Raya, Younes Bouizi, Sébastien Leclerc, Yann Le Berch, Cristian Torri, Anthony Dufour, Daniele Fabbri

Presenting Author: Andrea Facchin

Poster presentation | 31st European Union Biomass Conference and Exposition (EUBCE), Bologna (IT)

5-8 June 2023

Title: From biomass to sugars, , HTC-pyrolysis approach

Authors: Andrea Facchin, Cristian Torri, Yusuf Kucukaga, Daniele Fabbri

Presenting Author: Andrea Facchin

Oral presentation | 9th International Conference on Sustainable Solid Waste Management, Corfu, Greece

15-18 June 2022

Title: Hyperthermophilic fermentation of Food Waste allows the reliable recovery of Volatile Fatty Acids

Authors: Cristian Torri, Vittoria Stefanelli, Yusuf Kucukaga, Beatrice Galaverni, Agostino Seritti, Andrea Facchin

Presenting Author: Cristian Torri

Oral presentation | 9th International Conference on Sustainable Solid Waste Management, Corfu, Greece

15-18 June 2022

Title: Inorganic Gasses into Organic Acids for Polyhydroxyalkanoates Production: An Integrated Lab-Scale System for the Syngas Fermentation Coupled PHA Production

Authors: Yusuf Kucukaga, Andrea Facchin, Cristian Torri, Serdar Kara

Presenting Author: Yusuf Kucukaga

Oral presentation | 18th International Conference on Renewable Resources and Biorefineries, Brugge (BE)

1-3 June 2022

Title: Improvement of power to PHA pathway: Mixed culture fermentation of hydrogen within biochar-based materials

Authors: Yusuf Kucukaga, Andrea Facchin, Aaron Alfonsi, Cristian Torri, Serdar Kara

Presenting Author: Yusuf Kucukaga

Oral presentation | 18th International Conference on Renewable Resources and Biorefineries, Brugge (BE)

1-3 June 2022

Title: Microbial Funneling of Pyrolysis Product for the Production of Green Chemicals: Preliminary Investigations with Microbial Mixed Cultures

Authors: Andrea Facchin, Yusuf Kucukaga, Cristian Torri, Serdar Kara

Presenting Author: Andrea Facchin

Oral presentation | International conference on Pyrolysis “Pyro2022”, Ghent (BE)

15-20 May 2022

Title: Fermentable sugars obtainment through pyrolysis and hydrolysis of water-soluble pyrolysis products over solid acid catalyst

Authors: Andrea Facchin, Adriano Parodi, Yusuf Kucukaga, Cristian Torri, Daniele Fabbri

Presenting Author: Andrea Facchin

Oral presentation | 5th European Conference on Green and Sustainable Chemistry (European Chemistry Society)

27-29 September 2021

Title: Thermochemical-Biological Systems: Pyrolysis Products as a source of green chemicals

Authors: Andrea Facchin, Yusuf Kucukaga, Cristian Torri, Serdar Kara, Daniele Fabbri

Presenting Author: Andrea Facchin

Poster presentation | 3rd International Conference for Bioresource Technology for Bioenergy, Bioproducts & Environmental Sustainability (by ELSEVIER)

17-19 May 2021

Title: Revalorization of Biomass Through a Hybrid Thermochemical-Biological Biorefinery Concept: Pyrolysis Liquid and Syngas as Feedstock for Building Block Chemicals Fermentation

Authors: Yusuf Kucukaga, Andrea Facchin, Serdar Kara, Daniele Fabbri, Cristian Torri



TEACHING

Laboratory Tutor | Didactic Chemistry Laboratory, Navile District, Università di Bologna

May 2024

Activities: support to the laboratory activity in the Master course of Clinical and Forenses Chemistry. Activities included: deternination of fire accelerants trough HS-SPME-GC-FID, progesteron detection, trace of lipstick brand identification trough HPLC-DAD technique.

Laboratory Tutor | Laboratory of Environmental Science “Renzo Sartori” (Via Sant’Alberto 163, Ravenna, Università di Bologna)

November 2023 – January 2024

Activities: support to the lectures in the master course of Chemical analysis of the environmental quality. Activities included: air quality control trough particulate sampling and analysis, in particular PHA determination and markers assessment (i.e., levoglucosan); water control trough salts and contaminants analysis.

Laboratory Tutor | Laboratory of Environmental Science “Renzo Sartori” (Via Sant’Alberto 163, Ravenna, Università di Bologna)

October 2022 – January 2023

Activities: support to the lectures in the master course of Chemical analysis of the environmental quality. Activities included: air quality control trough particulate sampling and analysis, in particular PHA determination and markers assessment (i.e., levoglucosan); water control trough salts and contaminants analysis.



OTHER ACTIVITIES

National Workshop organization | “Workshop Plastiche&Ambiente”, Ravenna, 2025

5-6 June 2025

Subject: National workshop on plastic effect on the environment and novel solutions for the monitoring and production of sustainable bioplasticts.

Event Website: <https://eventi.unibo.it/workshop-plastiche-ambiente>

Role: Member of the Scientific Committee, Member of the Organisation Committee.

National Workshop organization | “Workshop Plastiche&Ambiente”, Ravenna, 2024

6 June 2024

Subject: National workshop on plastic effect on the environment and novel solutions for the monitoring and production of sustainable bioplasticts.

Event Website: <https://eventi.unibo.it/workshop-plastiche-ambiente>

Role: Member of the Organisation Committee.

Postgraduate position | Environmental science laboratory “Renzo Sartori” (Via Sant’Alberto 163, Ravenna, University of Bologna)

1 May 2021 – 31 October 2021

Subject: Development of thermochemical-biological systems for the conversion of gaseous substrates and pyrolysis products, in order to obtain chemicals of interest

Tutor: [Cristian Torri](#)

Main activity: Evaluation of the chemical characteristics and biological suitability of pyrolysis products from different biomasses. Pre-treatment of different biomasses in order to assess their effect on the pyrolysis product and fermentation.

Intern | Environmental science laboratory “Renzo Sartori” (Via Sant’Alberto 163, Ravenna, University of Bologna)

February 2020 – March 2021

Main activity: Development of a hybrid thermochemical-biological system, combining pyrolysis and anaerobic digestion to produce Volatile Fatty Acids. Chemical characterization of the pyrolysis products, using different chemical approaches. Development of an anaerobic bioreactor, on a laboratory scale, with the automatic control of temperature, gas volume, and liquid recirculation.

Intern | Laboratory of soil and pollutants (Via delle Scienze 206, DI4A, University of Udine)

September 2017 – April 2018

Tutor: [Maria De Nobili](#)

Main activity: Soil carbonates titrations, analysis of the soil components and isotopes with CHN, metal analysis with ICP-OES and ICP-MS.

Intern | Chemical laboratory-Buzzi Unicem s.p.a.

1-31 JULY 2013

Analysis of the carbonates, sulfates, and cations, and physical property in the concrete



SKILLS

- Microsoft Office
- Faunalia QGIS course
- Arduino (Soft)
- Chemical analysis and characterization
- 3D printer (Soft)
- AutoCAD 3D (Soft)
- Inventor (Soft)
- Work organization
- Problem-solving
- Team working
- English level C1



OTHER ACTIVITIES

- Blood donor and member of Friulan Blood Donor Association (AFDS) and the Association of Volunteers Blood Donor of Italy (AVIS)
- Member of the Organ Donor, Italy (ADO)
- Manager of the University of Bologna’s websites “[Analytical Pyrolysis](#)” and “[Saltafossi](#)”
- Organization member of the Workshop “[Plastiche&Ambiente](#)”

In compliance with the GDPR and the Italian Legislative Decree no. 196 dated 30/06/2003, I hereby authorize you to use and process my personal details contained in this document.

Date and place

Andrea Facchin