ANDREA
FACCHIN

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Andrea Facchin
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OBJECTIVE

Work in the field of research, find innovative solutions for the management and recovery of energy and material from biomass and urban/industrial wastes, to mitigate human impacts on the environment and produce sustainable chemicals and materials.

EXPERIENCE

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 prestegious guests, based on the Green Chemistry innovation and approch for the development of new solutions for a suostainable 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 where 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 focued 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

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 H_2/CO_2 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 H_2 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 (Accepted for publication May 2024)
DOI: https://doi.org/10.1016/j.jaap.2024.106544

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/greenhydcm

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 Lorrain, 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

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: Inorganic Gasses into Organic Acids for Polyhydroxyalkanoates Production: An Integrated Lab-Scale System for the Syngas Fermentation Coupled PHA Production
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 forthe 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
Presenting Author: Andrea Facchin

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 inluded: determination 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 – Jenuary 2024
Activities: support to the lectures in the master course of Chemical analysis of the environmental quality. Activities inluded: 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 – Jenuary 2023
Activities: support to the lectures in the master course of Chemical analysis of the environmental quality. Activities inluded: 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

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 other 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 curse
- 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

- One of the founders of SPIAGGIALONGA and the Workshop“Plastiche&Ambiente” in the Unibo’s Ravenna campus
- 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 of Friuli Venezia-Giulia (ADO-FVG)
- 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*