Name: Luca Lenzi
Email: luca.lenzi15@unibo.it
Google Scholar: Link
Languages: Italian (native), English, Spanish

Curriculum Vitae

PROFESSIONAL EXPERIENCE

11/2024 – Present: **Post-doc researcher at DICAM - Department of Civil, Chemical, Environmental and Materials Engineering, University of Bologna**
Current research focuses on the design and synthesis of bio-based functional additives, such as plasticizers and reactive modifiers, from renewable feedstocks. The research activities explore their integration into various sustainable polymer matrices, including polyhydroxyalkanoates (PHAs) and polylactic acid (PLA), to enhance performance, processability, and end-of-life recyclability. The research activities extended toward the development of sustainable polymer composites based on bio-based and biodegradable matrices reinforced with natural or functionalized fillers. Particular attention is devoted to interfacial interactions, reactive compatibilization strategies, and the implementation of dynamic or reversible chemistries to improve structural performance while maintaining recyclability and circularity principles

11/2021 – 03/2024 : **PhD fellow at DICAM - Department of Civil, Chemical, Environmental and Materials Engineering, University of Bologna**
The research activities focused on the development of functional, bio-based additives, such as plasticizers and dynamic crosslinkers, and their application in advanced polymer systems. The work includes the formulation and characterization of fully bio-based and recyclable materials, particularly targeting polyhydroxyalkanoates (PHAs), polylactic acid (PLA), and dynamically crosslinked elastomers, with attention to circular economy principles and sustainable synthesis routes.

01/2024 – 07/2024: **visiting PhD fellow at ICTP - Instituto de Ciencia y Tecnología de Polímeros, Consejo Superior de Investigaciones Científicas (CSIC), Madrid**
Research activities investigated the use of a bioplasticizer as a sustainable alternative to conventional additives in Natural Rubber (NR) and Epoxidized Natural Rubber (ENR) formulations. The study also explored the design of a bio-based crosslinking system capable of introducing recyclability into ENR through the formation of covalent adaptive networks (CANs). A novel chemical pathway and a dedicated recycling protocol were developed, enabling dynamic bond exchange and preserving the mechanical integrity of the materials after reprocessing.

06/2020 – 10/2021: **Technical Department, R&D chemical products - Edilteco Spa/ Ecoterm Srl**
Worked within the R&D and technical departments of a company specializing in lightweight concretes for thermal and acoustic insulation and fire protection. Activities involved the formulation and testing of polymer-based composites using expanded polymers, as well as

parallel research and quality control tasks for a subsidiary company producing copper oxide powders and chromite flour.

03/2019 - 10/2019: **Master's degree internship**
The project covered the study of bio-based amino hardener, Adenine, and its reaction with infusion and impregnation epoxy resins. The laboratory activities then focused on the production of short fibers composite materials with recycled carbon fibers and with natural fibers.

09/2016 - 03/2017: **Bachelor's degree internship**
During this project I studied gel systems made of Poly (3-hydroxybutyrate) and of various green solvents. The aim of this project was to find a green and reusable materials that could help art restoration operators during the cleaning of paints and statues.

EDUCATION

- *11/2021- 03/2024:* **PhD fellow at DICAM - Department of Civil, Chemical, Environmental and Materials Engineering,** University of Bologna.
  Subject: **Material Science**

- *11/2017- 10/2019:* **Master's degree in Industrial Chemistry,** University of Bologna.
  Subject: **Polymer Science**
  Grade: **107/110**

- *11/2012- 03/2017:* **Bachelor's degree in Industrial Chemistry**, University of Bologna.
  Subject: **Polymer Science**
  Grade: **93/110**

PUBBLICATIONS

- Martellosio L., Ferri M., Lenzi L., Tauro A., Andrea Dorigato, Micaela Degli Esposti, Davide Morselli, and Paola Fabbri (2026). Tailored Plasticization of Bio- and Fossil-Based Polymers Using a Versatile Bioplasticizer Derived from Phenylacetic Acid and Glycerol. *ACS Polymers Au*, *6* (1), 353-365 https://doi.org/10.1021/acspolymersau.5c00149

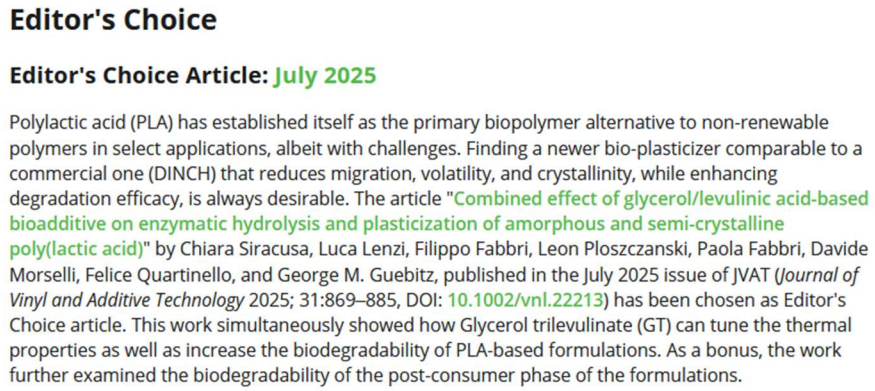
- Lenzi, L., Chicharro, J. C., Degli Esposti, M., Morselli, D., Hernández Santana, M., & Fabbri, P. (2025). From Levulinic Acid to Imines: Creating Biobased, Recyclable, Cross-linked Rubbers through Covalent Adaptive Networks. *ACS Polymers Au*, *5*(5), 656–668. https://doi.org/10.1021/acspolymersau.5c00108

- Lenzi, L., Mas-Giner, I., Degli Esposti, M., Morselli, D., Hernández Santana, M., & Fabbri, P. (2025). Competing Effects of Plasticization and Miscibility on the Structure and Dynamics of Natural Rubber: A Comparative Study on Bio and Commercial Plasticizers. *ACS Polymers Au*, *5*(3), 298–310. https://doi.org/10.1021/acspolymersau.5c00009

- Shariatikia, F., Sangroniz, L., Olmedo-Martínez, J. L., Pérez-Camargo, R. A., González, A., Lenzi, L., Degli Esposti, M., Morselli, D., Fabbri, P., & Müller, A. J. (2025). Effect of Biobased Glycerol Trilevulinate on the Crystallization Kinetics of Biodegradable Polyesters. *ACS Sustainable Chemistry and Engineering*, *13*(12), 4884–4896. https://doi.org/10.1021/acssuschemeng.5c00178

- Siracusa, C., Lenzi, L., Fabbri, F., Ploszczanski, L., Fabbri, P., Morselli, D., Quartinello, F., & Guebitz, G. M. (2025). Combined effect of glycerol/levulinic acid-based bioadditive on enzymatic hydrolysis and plasticization of amorphous and semi-crystalline poly(lactic acid). *Journal of Vinyl and Additive Technology*, *31*(4), 869–885. https://doi.org/10.1002/vnl.22213

  Article has been selected as Editor's Choice (July 2025)

  Editor's Choice

  Editor's Choice Article: July 2025

  Polylactic acid (PLA) has established itself as the primary biopolymer alternative to non-renewable polymers in select applications, albeit with challenges. Finding a newer bio-plasticizer comparable to a commercial one (DINCH) that reduces migration, volatility, and crystallinity, while enhancing degradation efficacy, is always desirable. The article "Combined effect of glycerol/levulinic acid-based bioadditive on enzymatic hydrolysis and plasticization of amorphous and semi-crystalline poly(lactic acid)" by Chiara Siracusa, Luca Lenzi, Filippo Fabbri, Leon Ploszczanski, Paola Fabbri, Davide Morselli, Felice Quartinello, and George M. Guebitz, published in the July 2025 issue of JVAT (*Journal of Vinyl and Additive Technology* 2025; 31:869–885, DOI: 10.1002/vnl.22213) has been chosen as Editor's Choice article. This work simultaneously showed how Glycerol trilevulinate (GT) can tune the thermal properties as well as increase the biodegradability of PLA-based formulations. As a bonus, the work further examined the biodegradability of the post-consumer phase of the formulations.

- Ferri, M., Lenzi, L., Degli Esposti, M., Martellosio, L., Benítez, J. J., Hierrezuelo, J., Grifé-Ruiz, M., Romero, D., Guzmán-Puyol, S., Heredia-Guerrero, J. A., Morselli, D., & Fabbri, P. (2025). Triphenyl Acetic Glyceroate as a sustainable multifunctional additive for developing transparent, biodegradable, and flexible polylactide green alternative to polyethylene-based films for food packaging. *Chemical Engineering Journal*, *508*, 160887. https://doi.org/10.1016/j.cej.2025.160887

- Chicharro Sestines, J. C., Mas-Giner, I., Lenzi, L., Verdejo, R., López-Manchado, M. Á., Utrera-Barrios, S., & Hernandez Santana, M. (2025). in Repair: Innovations in self-healing elastomers for enhanced material longevity and sustainability. Saul Utrera-Barrios and Marianella Hernández Santana (Ed.), *Rubber Materials* (1st ed., pp. 379–406). Elsevier. https://doi.org/10.1016/B978-0-443-28989-7.00005-5

- Togliatti, E., Lenzi, L., Degli Esposti, M., Castellano, M., Milanese, D., Sciancalepore, C., Morselli, D., & Fabbri, P. (2024). Enhancing melt-processing and 3D printing suitability of polyhydroxybutyrate through compounding with a bioplasticizer derived from the valorization of levulinic acid and glycerol. *Additive Manufacturing*, *89*(July), 104290. https://doi.org/10.1016/j.addma.2024.104290

- Lenzi, L., Degli Esposti, M., Braccini, S., Siracusa, C., Quartinello, F., Guebitz, G. M., Puppi, D., Morselli, D., & Fabbri, P. (2023). Further Step in the Transition from Conventional Plasticizers to Versatile Bioplasticizers Obtained by the Valorization of Levulinic Acid and Glycerol. *ACS Sustainable Chemistry & Engineering*, *11*(25), 9455–9469. https://doi.org/10.1021/acssuschemeng.3c01536

- Raucci, A., Miglione, A., Lenzi, L., Fabbri, P., Di Tocco, J., Massaroni, C., Presti, D. Lo, Schena, E., Pifferi, V., Falciola, L., Aidli, W., Di Natale, C., Netti, P. A., Woo, S. L., Morselli, D., & Cinti, S. (2023). Characterization and application of porous PHBV-based bacterial polymers to realize novel bio-based electroanalytical (bio)sensors. *Sensors and Actuators B: Chemical*, *379*(December 2022), 133178. https://doi.org/10.1016/j.snb.2022.133178

CONFERENCES

- **Macrogiovani**, Pisa (Italy), May 2022– Oral Contribution Title: "Recyclable Bio-Based Rubber Via Imine Chemistry: From Levulinic Acid To Covalent Adaptive Networks".
- **Polymer Engineering and Science International** (PESI), Tokyo (Japan), July 2024– Oral Contribution Title: "Advancing Towards Versatile Bioplasticizers Derived From Levulinic Acid And Glycerol: A Progressive Shift From Conventional Plasticizers".

- **9th International Conference on Self-Healing Materials**, Madrid (Spain), June 2024– Oral Contribution Title: "Enhanced Durability, Processability And Recyclability Through Biobased Additives In Environmentally Friendly Elastomers".

- **MoDeSt Workshop**, Sofia (Bulgaria), September 2023– Oral Contribution Title: "A Further Step In The Transition From Conventional Plasticizers To Versatile Bioplasticizers Through The Valorization Of Levulinic Acid And Glycerol".

- **Merck Young Chemists Symposium**, Rimini (Italy), November 2022– Oral Contribution Title: "Glycerol Trilevulinate As Versatile Bioplasticizer Obtained By The Valorization Of Levulinic Acid And Glycerol".

- **Macrogiovani**, Florence (Italy), June 2022– Oral Contribution Title: "Glycerol Trilevulinate As Fully Bio-Based Plasticizer: Synthesis And Effects On Thermo-Mechanical Properties On Several Polymeric Matrices".

- **Polymers 2022**, Turin (Italy), May 2022. Poster title "Glycerol Trilevulinate: A Step Forward In The Transition From Plasticizers To Bioplasticizers".

AWARDS AND PRICES

- Best oral presentation award: Macrogiovani 2025, Pisa (Italy), May 2025
- Best oral presentation award: 9th International Conference on Self-Healing Materials, Madrid (Spain), June 2024
- Doctoral prize: Institute of advanced study (ISA), November 2023
- Best oral presentation award: MoDeSt Workshop, Sofia (Bulgaria), September 2023
- Best oral presentation award: Macrogiovani, Florence (Italy), June 2022
- Marco Polo scholarship winner (2024)
- Erasmus+ scholarship winner (2024)

OTHERS

- **Conference Organization:**
  9th International Conference on Self-Healing Materials, Madrid (Spain), June 2024
  Organizing Committee Member:
  managing of speaker logistics, coordination venue arrangements

- **Tutoring Experience:**

  - Course: COMPOSITE MATERIALS AND TECHNOLOGY M [cod. 87128] - Module 1
    Institution: University of Bologna, Department of Civil, Chemical, Environmental and Materials Engineering
    Academic year 2025/2026

  - Course: COMPOSITE MATERIALS AND TECHNOLOGY M [cod. 87128] - Module 1
    Institution: University of Bologna, Department of Civil, Chemical, Environmental and Materials Engineering
    Academic year 2024/2025

  - Course: COMPOSITE MATERIALS AND TECHNOLOGY M [cod. 87128] - Module 1
    Institution: University of Bologna, Department of Civil, Chemical, Environmental and Materials Engineering
    Academic year 2023/2024