



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA



Universidad
de Cádiz

11 Giugno 2025

Orario: 10.00 – 12.00

Aula N “Toso Montanari” – UE4

Additive Manufacturing of Sustainable Polymer Composites

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This seminar will introduce innovative strategies in the design and formulation of **sustainable polymer composite systems for 3D printing**. As additive manufacturing (AM) increasingly intersects with green chemistry and advanced materials design, this lecture will offer an in-depth look at how chemists contribute to the development of novel, environmentally conscious composite materials through molecular engineering and structure–property control.

A first part focuses on the formulation of sustainable thermoplastic composites for **Large-Format Fused Granulate Fabrication** (LF-FGF) 3D printing. Unlike filament-based techniques, FGF allows the direct extrusion of polymer granules, enabling the use of recycled, biobased, or chemically modified thermoplastics at scale. We will explore how polymer properties and polymer–filler interactions influence both processing and final properties, and how surface-modified natural fillers or upcycled industrial residues can be incorporated to create high-performance composites for structural applications. A second part shifts focus to acrylate-free photocurable resin systems for **Vat Photopolymerization** (VP) 3D printing, an area where chemistry plays a central role. Traditional acrylates used in vat photopolymerization present toxicity and sustainability concerns. In response, we will discuss the synthesis and application of alternative photopolymer networks derived from bio-based building blocks, and the surface modification of sustainable natural (nano)fillers used for the obtainment of functional composite resins.



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