

## Bio-based Plastics with Antimicrobial Enhancement

PhD Candidate: Everton Henrique Da Silva Pereira

### Upcycling of plastic waste into biomaterials and enhancement of their antimicrobial properties

The objective of Everton Henrique Perreira's PhD project is to develop bio-based biodegradable materials with antimicrobial properties by utilizing sustainable sources, with the intention of catering to potential applications in a broad range of industries from biosensors or food industry. Bioprocessed polymers present an avenue to channel carbon-rich resources derived from biomass or waste polymer building blocks towards creating naturally biodegradable, compostable, and recyclable plastics and bioproducts. The main bio-based agent employed in this project is bacterial nanocellulose (BNC), which stands out as the purest form of cellulose available and a potential eco-friendly alternative. Our approach lies in combating the considerable environmental threat posed by plastic pollution by harnessing BNC as a viable material source for producing biodegradable plastic alternatives not only by replacement but also by the addition of this material in the life cycle of petroleum-based plastics. We have been exploring the potential of waste-recovered synthetic polymers to work as an adjunct in the BNC production, optimize the bio-based polymer's production chain from upstream to downstream, and the developing of new materials with active bio compounds. Our goal is to develop plastic circularity through the incorporation of plastic waste, mitigating the impact of plastic pollution, and increasing the efficiency and sustainability of the production of bio-based materials.

