

**MAUÁ INSTITUTE OF TECHNOLOGY – MAUÁ SCHOOL OF ENGINEERING
LABORATORY OF BIOCHEMICAL ENGINEERING**

Research Group: Biological Wastewater Treatment.

Location: Laboratory of Biochemical Engineering (Mauá Institute of Technology - room R-352).

Researchers: Prof. Dr. José Alberto Domingues Rodrigues (rodrigues@maua.br)
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Description: Our research group deals with environmental biotechnology. We work on processes that involve biological treatment of wastewater and bioprocess engineering, considering the environmental compliance of sanitary, industrial, and agro-industrial effluents. The bioreactors (Figure 2) we use are anaerobic reactors operated in sequencing batch and/or fed-batch mode, either with mechanical agitation or with liquid phase recirculation, using granulated biomass (ASBR) or biomass immobilized on inert supports (AnSBBR). We study the effect of process variables such as agitation type, bioparticle size, duration of the various stages of the process, and feeding strategy, on the removal efficiency of organic matter (carbonaceous, nitrogenous, and sulfurous) and micropollutants, as well as on the production of bioenergy (hydrogen and methane), biopolymers and biomolecules, also considering the possible need for supplementation of substances (buffering, micro and macronutrients). These studies allow us to gain more insight into fundamental topics related to kinetics, bioreactors, and mass transfer and hence provide information for the full-scale use of the investigated technological configurations.

Main line of research: Application of anaerobic sequencing batch and/or fed batch bioreactors (ASBR/AnSBBR) for the treatment of wastewater aiming at environmental compliance and the production of bioenergy, biopolymers, and biomolecules, in addition to the removal of micropollutants.

Instagram: @imtbiochemlab

Main research project:

- Consolidation of the biorefinery concept applied to the biological treatment of wastewater and solid wastes.
- ATIVA-ETE: Evaluation of innovative technologies for the removal of nitrogen and micropollutants in wastewater treatment plants (WWTP)

Main financing: FAPESP, CNPq, CAPES e SABESP

Main publications: (2022-2023)

- Ramos, L.R.; Lovato, G.; Rodrigues, J.A.D.; Silva, E.L. Scale-up and Energy Estimations of Single and Two-Stage Vinasse Anaerobic Digestion Systems for Hydrogen and Methane Production. *Journal of Cleaner Production*, 349, 2022. ([Article 131459](#))
- Paulinetti, A.P.; Augusto, I.M.G.; Batista, L.P.P.; Tavares, A.G.B.; Albanez, R.; Ratusznei, S.M.; Lovato, G.; Rodrigues, J.A.D. Anaerobic Digestion as a Core Process for Sustainable Energy Production in the Soybean Biorefinery: A Techno-Economic Assessment. *Sustainable Horizons*, 03, 2022. ([Article 100024](#))
- Castilho, T.G.; Rodrigues, J.A.D.; García, J.; Subtil, E.L. Recent Advances and Perspectives in the Use of Conductive Materials to Improve Anaerobic Wastewater Treatment: A Systematic Review Approached. *Journal of Water Process Engineering*, 50, 2022. ([Article 103193](#))
- Almeida, P.S.; Menezes, C.A.; Camargo, F.P.; Sakamoto, I.K.; Lovato, G.; Rodrigues, J.A.D.; Varesche, M.B.A.; Silva, E.L. Biomethane Recovery Through Co-Digestion of Cheese Whey and Glycerol in a Two-Stage Anaerobic Fluidized Bed Reactor: Effect of Temperature and Organic Loading Rate on Methanogenesis. *Journal of Environmental Management*, 330, 2023. ([Article 117117](#))
- Batista, L.P.P.; Paulinetti, A.P.; Ferraz Júnior, A.D.N.; Albanez, R.; Ratusznei, S.M.; Etchebehere, C.; Lovato, G.; Rodrigues, J.A.D. Two-Stage Thermophilic Anaerobic Digestion of Cheese Whey: Process Optimization, Comparison With Single-Stage and Full-Scale Estimation. *Chemical Engineering and Processing*, 183, 2023. ([Article 109260](#))
- Ebrahimian, F.; Lovato, G.; Alvarado-Morales, M.; Ashrafd, M.T.; Rodrigues, J.A.D.; Tsapekos, P.; Angelidaki, I. Iron Limitation Effect on H₂/CO₂ Biomethanation: Experimental and Model Analysis. *Journal of Environmental Chemical Engineering*, 11, 2023. ([Article 109529](#))
- Paulinetti, A.P.; Batista, L.P.P.; Lazaro, C.Z.; Albanez, R.; Ratusznei, S.M.; Lovato, G.; Rodrigues, J.A.D. Applying Mesophilic Anaerobic Digestion in a Soybean Biorefinery Concept: Operational Optimization and Techno-Economic Feasibility. *Energy*, 279, 2023. ([Article 128061](#))
- Almeida, P.S.; Menezes, C.A.; Augusto, I.M.G.; Paulinetti, A.P.; Lovato, G.; Rodrigues, J.A.D.; Silva, E.L. Integrated Production of Hydrogen and Methane in a Dairy Biorefinery Using Anaerobic Digestion: Scale-Up, Economic and Risk Analyses. *Journal of Environmental Management*, 348, 2023. ([Article 119215](#))



