

INVITED - SENSORES E BIOSSENSORES

**NANOMATERIALS AND FUNCTIONAL FILMS IN SENSORS, BIOMIMETICS,
AND ELECTRONIC DEVICES**

Laura Péres (laura.peres@unifesp.br)

Luciano Caseli (lcaseli@unifesp.br)

Nanostructured materials and organized thin films have become important platforms for functional devices in sensing, biointerfaces, and organic electronics. These research lines focus on integrating nanomaterials, biomimetic assemblies, and conjugated polymers to produce films with tailored physicochemical properties. A central approach involves the fabrication of Langmuir and Langmuir–Blodgett (LB) films, as well as spin-coated and cast films incorporating lipids, enzymes, nanoparticles, liquid crystal, biomimetic molecules, and other polymers¹. These organized systems provide controlled molecular architectures that mimic biological membranes, enabling studies of bioactive compounds interacting with lipid interfaces and supporting the development of bioinspired sensing platforms. Such films allow control of molecular packing, orientation, and surface density, parameters that strongly influence electronic, catalytic, and interfacial properties. The synthesis and processing of conjugated polymers also play a key role in constructing hybrid nanostructures and electronic devices. Conjugated polymers can act as optoelectronic materials or as matrices capable of accommodating enzymes, nanoparticles, and other functional molecules while preserving their activity. Their electronic properties and processability make them attractive for chemical and biosensors, flexible electronics, and energy-related devices. Integrating

biomolecules and nanostructured materials within organized polymeric films enables multifunctional architectures with enhanced catalytic performance and signal transduction, offering promising opportunities for sensors, biomimetic interfaces, and next-generation electronic devices.

Acknowledgements: FAPESP - processo nº 2025/27044-5 e CNPq - processo: 408449/2024-1

Keywords: Bio-batteries, Organic Redox Flow Batteries, Sustainable Energy, Yeast Bioelectronics, Wearable Devices, Small Molecules.

References

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Palavras-chave: nanomaterials; functional films in sensors; biomimetics; electronic devices.