Contribution ID: **1044** Type: **Oral Presentation**

Porous biohybrid multifunctional membranes for biosensors and bioremediation

Wednesday 24 May 2023 15:40 (30 minutes)

Synthetic membranes are among the most effective technology in separation, fractionation, concentration, and purification. Their nanostructured pores have demonstrated their unique role also in implementing processes such as catalysis, and molecular recognition. Engineering the chemistry of the material, the structure of the pores, and the process conditions permits an extension of the areas of application of membranes. The combination of porous and mesoporous membranes with biomolecules leads to the development of artificial membranes with biofunctional properties. Biorecognition and bioconversion confined in micro and nanoscale compartments are emerging as important properties in the development of membrane-based biosensing and biocatalytic tools. For example, the trace presence of recalcitrant micropollutants (such as pesticides, antibiotics, hormones, etc.) in the environment causes chronic exposure that represents a threat to health and socio-economic wellness. The availability of technologies able to detect and eliminate trace micropollutants appears to be crucial.
The lecture will discuss the development of biofunctionalized porous membranes and their ability in intercepting traces of a model pesticide (such as paraoxon). The capability of membranes functionalized with an enzyme (phosphotriesterase) to fully degrade the pesticide will be also illustrated.
Superparamagnetic plasmonic nanoparticles (core-shell iron-gold nanoparticles) conjugated with enzymes are orderly arranged in porous polymeric frameworks able to accumulate the trace contaminant and enhance the interaction with the biochemical receptor. The role of membrane material, pore size, structure, morphology, topography, thickness, and surface energy on the mass transport, molecular interaction, and stabilization of the biomolecules will be outlined.

Participation

In-Person

References

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