Contribution ID: **134** Type: **Regular talk**

Multifunctional nanocomposite membranes for environmental remediation of contaminants of emerging concern

Friday, 24 September 2021 13:30 (10 minutes)

Human health and well-being strongly depend on water quality available for consumption. Deterioration of water quality has become one of the most worrying and urgent problems since about 1.6 million people die annually from illness related to unsafe water consumption, being responsible for at least 3900 children deaths per day in developing countries. In this scope, one of the main concerns is the release of emerging pollutants, such as pharmaceuticals and heavy metals, into wastewater [1].
Combining multifunctional membranes and photocatalytic, adsorbent, and antimicrobial materials in a unique membrane is considered one of the most suitable strategies for environmental remediation [1-2].
For this purpose, Ag-TiO2, Au-TiO2 and Y2(CO3)3 nanoparticles were synthesized and immobilized within poly(vinylidene fluoride-hexafluoropropylene), (PVDF-HFP). The physical-chemical properties of the fillers and membranes were characterization, together with the As(V) adsorption, and norfloxacin (NOR) photocatalytic removal efficiency, and antimicrobial activity.
The Y@Au-TiO2/PVDF-HFP multifunctional membranes present an efficiency of 89% in the degradation of NOR under ultraviolet (UV) radiation, 70% under visible radiation, and 93% in As(V) adsorption from water containing both contaminants simultaneously. The Ag-TiO2/PVDF-HFP multifunctional membranes show degradation efficiencies of 64.2% under UV and 80.7% under visible radiation, for 90 and 300 minutes, respectively. Furthermore, the recyclability of the multifunctional membranes has also been demonstrated. Finally, it was shown the antimicrobial activity of the nanocomposite membranes against E. coli and S. epidermidis.
In short, these results demonstrate the suitability of the produced nanocomposite membranes of Y@Au-TiO2/PVDF-HFP and Ag-TiO2/PVDF-HFP as multifunctional materials for environmental remediation.

Primary author: SALAZAR, Hugo (University of Minho)

Co-authors: MARTINS, Pedro (Centro/Departamento de Física, Universidade do Minho, 4710-057 Braga, Portugal, IB-S Institute of Science and Innovation for Sustainability, Universidade do Minho, 4710-057 Braga, Portugal); Dr FERDOV, Stanislav (University of Minho); BOTELHO, Gabriela (Centre of Chemistry, University of Minho); LANCEROS-MENDEZ, Senentxu (BCMaterials, Basque Center for Materials, Applications and Nanostructures, UPV/EHU Science Park; Ikerbasque, Basque Foundation for Science)

Presenter: SALAZAR, Hugo (University of Minho)

Session Classification: Materials and technologies for Health and Environment

Track Classification: Materials and Technologies for Health and Environment