

Polymer Chemistry

30th International Conference on

&

Materials Chemistry & Science

August 27-28, 2018 | Toronto, Canada

Photocatalytic hybrid devices: An innovative strategy for pollutants removal from water

Valentina Sabatini¹, H Farina¹, MA Ortenzi¹, D Meroni, L Rimoldi and S Ardizzone¹University of Milan, Italy²National Interuniversity Consortium for Materials Science and Technology, Italy

Since the mid-1990s, numerous studies on the treatment of natural and industrial waters by photocatalysis have been reported. The photocatalytic process can completely degrade several organic compounds and is promising in the case of polluted surface waters, such as lakes or seas, whose contamination may arise from industrial activities, but also from catastrophic events. In this study, a photocatalytic floating hybrid device was developed for environmental remediation applications in the case of surface waters containing organic contaminants and their vapors, such as fuels, oils, and chemical products. In fact, it may be difficult to remove these compounds using conventional remediation techniques due to the hydric area dimensions to be reclaimed. The innovative device proposed here is a multilayer polymeric/TiO₂ composite with a hydrophobic/superhydrophobic side, necessary to permit the device flotation during its application in water, and a photocatalytic layer active in the degradation of water pollutants. The hydrophobic side was obtained by synthesizing an oxygen permeable Polyacrylate-based polymer with high photochemical, mechanical and thermal resistance. A novel procedure involving the use of fluorinated co-monomers and controlling the polymeric foil morphology during solvent casting deposition was developed. On the other side of the polymeric foil, the photoactive TiO₂-based layer was obtained by an ad hoc multi-layer spray-coating deposition of a home-made transparent titania solution. The procedure permitted both to preserve the polymeric support properties and to favor the adhesion of the inorganic coating onto the organic surface, via a protective interlayer made of SiO₂ microparticles, prepared by adopting the Stober method. Starting from a multilayer hybrid composite, a highly versatile photo-catalytically active device was developed: the possibility to easily modulate the dimension of such device can pave the way towards new and strategic applications for both natural and industrial water treatments.

Biography

Valentina Sabatini is a young post-doc researcher in the Department of Chemistry at the University degli Studi di Milano, Italy. Her research interests lie in the area of polymeric materials, ranging from synthesis, characterization, and functionalization of several kinds of polymeric materials to their industrial application. She collaborates actively with researchers in other disciplines of materials science, particularly physical-chemistry and electrochemical area on the development of new hybrid and smart materials. The high number and quality of scientific papers, patents, oral communications in meetings and awards received can demonstrate her passion and devotion to her work and materials science.

valentina.sabatini@unimi.it

Notes: