Floating photocatalysts for a sustainable environmental remediation exploiting sunlight

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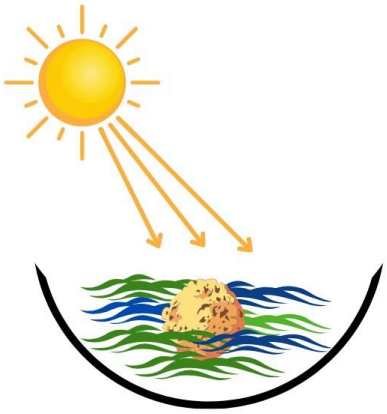
The chemical industry of the forthcoming years will be shaped by a number of emerging global megatrends strictly related to the demand of innovative materials able to solve new needs in different fields. Among them, environmental deterioration and the scarcity of fresh water have become imperative global issues to be solved nowadays. About 2.4 billion people are exposed to diseases caused by inadequate water sanitation. Additionally, a variety of organic and inorganic compounds, which arise either from anthropic activities or naturally, also contaminates drinking water lowering its quality.

In the last three decades, many efforts have been addressed to develop photoactive materials which could be suitable for real-world use in the field of water remediation. In this regard, water-floating photocatalysts could represent good alternatives to traditional materials thanks to their characteristics in terms of efficiency and reasonability including a high oxygenation of the photocatalyst surface, a fully solar irradiation, easy recovery and reuse

Thanks to its high photocatalytic activity and good stability TiO2 has been proved to be an excellent photocatalyst. However, because of its wide band gap (3.2 eV) its efficiency under solar light is dramatically limited. Hence, much effort has been devoted to improve the utilization of solar light by extending the photoresponse of TiO2 to the visible region. In this regard, conducting polymers (CPs), such as polyaniline (PANI) and polypyrrole (PPy), represent promising sensitizers to extend the spectral response of TiO2 to visible light. On the basis of our experience in the field of CPs preparation by innovative green approaches and in the advanced oxidation technologies,



in the present talk, very recent results will be exposed on the use of CPs-modified TiO2 3D materials floating on the water surface and fully exploiting solar irradiation. In this very preliminary tests, the degradation of two classes of pollutants has been investigated and the best materials were subjected to recycle tests in order to demonstrate their stability under the reaction conditions.

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