Floating Photocatalysts: innovative solar-driven materials for sustainable water remediation.

A small step for a big help to vulnerable communities.

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Water is life. Vulnerable communities, often exposed to pre-existing social and economic disadvantages, are disproportionately affected by water scarcity. These communities often lack access to adequate and safe water sources and are more vulnerable to the adverse effects of climate change and extreme weather events, which further exacerbate water scarcity. This problem is even more pronounced if we consider that water scarcity is a key factor in public health. Often, in fact, poor hygienic conditions put the population at risk of disease transmission [1].

Although many technological approaches have been developed for both purification and reuse of wastewater, cheap and very effective devices accessible to the most disadvantaged communities are not yet available. In this context, photocatalysis offers a valid practical alternative. Exploiting only a source of light and a proper photocatalysts, drugs, dyes, bacteria and many other hazardous species can be easily removed [2].

Recently, floating photocatalysts have emerged as alternative materials to traditional ones, since they maximize light utilization and surface aeration, enhancing pollutants abatement performance and decreasing post-treatment costs [3]. If properly developed to be sustainable and efficient, they could reshape sustainable wastewater treatment for future societies.

Herein, we present our results on the development of sustainable floating photoactive materials obtained by the immobilizing of TiO_2-free innovative photocatalysts (i.e., graphitic carbon nitride and bismuth oxyhalides) on eco-friendly floating supports (alginate spheres, natural sponges, and lightweight expanded clay aggregates). All these materials were tested for the removal of different types of organic pollutants (drugs, dyes, and polyphenols,) in different water matrix (deionized water and simulated drinking water) under solar light irradiation and the potentialities and limitations of each system will be discussed.

[1] https://www.cdc.gov.

[2] Chakravorty,A. et al., SCENV 2024, 8, 100155.

[3] Galloni, M.G. et al., Adv. Sust. Syst. 2024, 8, 2300565.