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Innovative floating photocatalysts for wastewater remediation: a fascinating world merging environmental protection and circular economy

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Water crisis caused by insufficient water supply and pollution currently leads to several problems related to drought, famine, and death.[1] The treatment of wastewater contaminated by different pollutants is thus of crucial environmental and commercial importance and it urgently requires fast and efficient solutions. Heterogeneous photocatalysis has emerged as an interesting strategy, operating under mild conditions, and degrading many pollutants without chemical oxidant addition.[2,3] In particular, photocatalytic floating devices are currently object of study to overcome issues related to the use of catalyst-based slurry systems and to maximize light utilization, and photocatalyst aeration.[4]
Herein, we present our recent results in the frame of the development and optimization of innovative floating photocatalysts obtained by immobilizing different catalysts (e.g., titanium dioxide, bismuth oxyhalides) on floating supports characterized by eco-friendly features (e.g., alginates, luffa, Lightweight Expanded Clay Aggregate, LECA).
A critical insight on the potentialities and/or shortcomings related to each single device will be discussed. A targeted physico-chemical characterization and a proper evaluation of the photocatalytic performances of the obtained devices towards different classes of pollutants (i.e., dyes, drugs, polyphenols) after exposure to solar light irradiation will be described.
The encouraging obtained results deserve a deeper study, but already open the view towards the future use of these systems in real applications, particularly in the perspective of conjugating environmental protection and circular economy.

Keywords: *floating photocatalysts, water remediation, environmental protection.*

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