Intensification of photocatalytic processes for niche applications in the area of water, wastewater and air treatment [preface]

Title: Intensification of Photocatalytic Processes for Niche Applications in the Area of Water, Wastewater and Air Treatment

Short title: Intensification of Photocatalytic Processes

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Photocatalysis and photoelectrocatalysis are attractive technologies with potential applications in several fields, such as environmental technology, chemical synthesis, energy, and medicine. Although thousands of research papers have been published reporting promising results, actual industrial applications still remain limited, principally in the area of environmental remediation. The lack of knowledge on photoreactor design among the wider scientific and industrial community and integration with conventional technologies are some of the factors that are limiting the adoption of these emerging technologies for remediation purposes.

In view of these challenges, this special edition of Chemical Engineering Journal intends to presents new progress in the fields of photocatalysis and photoelectrocatalysis in niche applications in the areas of water, wastewater, and air treatment. The special edition collects a list of papers concerning two approaches to improve the overall efficiency of a photocatalytic system: i) novel photocatalysts with high activity and visible light response and ii) process intensification (PI). The PI of photocatalysis/photoelectrocatalysis includes the coupling with other physical, chemical or biological systems and the elimination of photon limitation and mass transfer limitations. The last one is provided by the use of breakthrough designs for photoreactors, such as photocatalytic microreactors, photocatalytic membrane reactors, and photoelectrocatalytic reactors, using natural light and UV artificial radiation, such as commercial lamps, light-emitting diodes (LEDs) and optical fibers. This special edition will also provide to the readers a better understanding of the upmost importance of computational fluid dynamics (CFD) models as tools for a more accurate design of photoreactors, taking into account the fluid hydrodynamics, the lamp emission spectra and power, and the respective distribution of radiant energy inside the reactor.

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