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Editorial: Advanced treatment of toxic pollutants using 3D materials in wastewater

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Editorial on the Research Topic
Advanced treatment of toxic pollutants using 3D materials in wastewater

This Research Topic covers the development of environmental functional materials (apatite, zeolite-based nanocomposite, activated carbon …) as well as technologies (advanced oxidation process, electrochemical, photocatalysis, filtration, adsorption …) for practical environmental pollution remediation in the removal of both inorganic (cadmium, nitrate, phosphorous) and organic pollutants (dye) in several kind of wastewaters (domestic and industrial).

An article (Delgado-González et al.) was thus dedicated to phosphorus retention in small wastewater treatment plants using apatite reactive filters which appeared as efficient systems with a retention efficiency of about 16–17 g PO_4^- P/kg for the two investigated apatite columns. Another article by Wang et al. was focused on trace metal adsorption by bio-adsorbents through the study of the Cd^{2+} sequestration from aqueous solution using marine diatom biomass. Without any ionic competition, the non-living marine diatoms: *Chaetoceros, Nitzschia, and Thalassiosira sp.* seemed to be efficient adsorbents for the removal of Cd(II) with *Nitzschia* showing an adsorption capacity of about 289–430 mg g^{-1}. Two other articles (Hutagalung et al.; Liu et al.) focused on the removal of organic compounds. 3D-zeolite–modified TiO_2 composite appeared as an efficient material for the photocatalytic degradation of organic compounds (Liu et al.). The synthesized material based on the 3D network structure of the zeolite supporting P/$Ag/Ag_2O/Ag_3PO_4/TiO_2$ (PAgT) combined synergetic effects for the photocatalytic degradation of rhodamine B with a constant rate of 0.188 min^{-1}. The last article by Hutagalung et al. was dedicated to the effluent from textile wastewaters. The combination of ozone-based advanced oxidation process with a nanobubbles generator leads to the formation of ozone nanobubbles with 99.94% of size distributed in 216.9 nm, which is important for the gas-liquid efficiency process. Reactive oxygen species produced by the advanced oxidation step favored the conversion of pollutants to environmentally safe effluents with low level of chemical oxygen demand, ammonia content and total suspended solids, which represented key parameters for substantial recovery.

By covering a wide range of pollutants of diverse chemical nature, and a number of highly complementary solutions, all the works presented in this Research Topic is at the heart of current water resource issues. Improving solutions for the treatment of water is of major concerns, to 1) limit the impact on increasingly sensitive receiving environments, but also to 2) increase the ways to reuse water which is becoming a major interest for many countries.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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