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Nanocomposite aerogels for removing water organic pollutants.

At present, the water pollution is the most important problem for the environment sustainability. Among the contaminants that cause the greatest concern, there are the Contaminants of Emerging Concern (CECs). These compounds are PCBs, pesticides, herbicides, phenols, polycyclic aromatic hydrocarbons (PAHs), Persistent organic Pollutants (POPs) and Pharmaceuticals and Personal Care Products (PPCP). To remove these pollutants from wastewater conventional physical and biological wastewater treatment are used. Unfortunately, these treatments can only partially remove CECs, without degrading them. Heterogeneous photocatalysis, instead, could be used to degrade organic pollutants to simpler compounds or totally mineralize them [1]. Photocatalyst, in form of nanopowder or nanocomposite, is generally dispersed in a slurry reactor as suspended powder. Moreover, the use of photocatalyst nanopowder has some drawbacks, it increases the costs of powder separation from purified water and damages the reactor recirculation pump. A possible solution could be to fix the catalyst on supporting organic or inorganic materials [2]. To fix the powder, highly porous monolithic aerogels, which are easily obtained by drying physical gels with supercritical CO2, are very attractive materials. Physically crosslinked aerogels are obtained with different thermoplastic polymers such as polyethylene, syndiotactic polystyrene (s-PS), poly(2,6-dimethyl-1,4-phenylene oxide) (PPO), poly(ether-ether-ketone) or poly(lactic acid). Crosslinked aerogels with peculiar nanoporous crystalline structures are obtained by using PPO and s-PS. It is known that these systems absorb volatile organic compounds (VOCs), halogenated or aromatic hydrocarbons, from water and air, also when present at very low concentrations [3]. In this contribution, the photocatalytic activity of different nanocomposites catalyst/aerogel based on N-doped TiO2 and ZnO as catalysts and s-PS as polymeric matrix, in the degradation of target pollutants is reported and compared with that of the catalysts in powder form.

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2. C. Daniel et al., *Macromol Rapid Commun* 34 (2013), 1194–1207.
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Preferred topic

Polymers and environment

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