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Enhanced bonding between TiO_2-Graphene oxide

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Since an increasing number of emerging pollutants has been found in wastewater and natural water systems [1], many researchers are developing new synergy-effective methods for their abatement [2]. In this context, we fabricate titanium dioxide-graphene oxide (TiO_2-GO) heterostructures as photocatalysts, which can efficiently react with organic species under solar light and can enhance the adsorption of water pollutants [3]. Many studies have shown that TiO_2-GO heterostructures can quickly mineralize organic dyes in solution under UV-light. However, it is not clear if these materials can provide the same performances under sunlight and with complex real water systems. Hence, this research aims to study the photocatalystic property on GO-TiO_2 composites with aqueous solutions of selected emerging pollutants under visible light. The samples were synthesized via the *in-situ* sol-gel nucleation and growth of TiO_2 nanoparticles on GO sheets at 1wt% of GO and pH 6 for 4 hours under thermal [4] or hydrothermal synthesis. The structure and the properties of the new materials were studied by varying the synthesis conditions. The morphology of such composites was characterized by XRD, SEM and TEM analysis. Besides, the study of Ti-O-C and Ti-C interface bonding was carried out using XPS. The band-gap energy was determined using a UV-VIS spectrophotometer equipped with an integrating sphere. Thus, it was possible for us to determine the reactivity of the new photocatalysts under the visible light. Finally, the photocatalytic performances of the GO-TiO_2 heterostructures were examined on the model pollutants in a solar simulator.

References:
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