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INNOVATIVE THREE-DIMENSIONAL GRAPHENE DECORATED WITH IRON NANOPARTICLES FOR WATER TREATMENT

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In recent years, research on emerging contaminants has become more frequent in the country, as the water that the population consumes is not free of impurities. This occurrence is due to inappropriate discharges in the environment, mainly in watercourses, of products such as drugs, hygiene and cleaning products,among others. Water treatment plants do not have the appropriate methods to remove these compounds. Filters based on three-dimensional graphene species (3D-rGO) are materials capable of mitigating the impacts of these contaminants. They have excellent physical-chemical, thermal, electrical, and mechanical properties, presenting as a characteristic the insignificant capacity for adsorption and removal of molecules from the aqueous médium. Such materials, when decorated with metallic nanoparticles, have unique properties and can act, for example, as catalysts in the degradation of pollutants. In this context, the present work aims to synthesize and characterize a material based on 3D-rGO with iron nanoparticles to degrade emerging contaminants. We use a thermochemical route, environmentally friendly, patented by our group (BR10202001803). The method is based on the graphene oxide and metallic precursor reduction in a single step, via hydrothermal route, in an autoclave, and the presence of reducing and passivating agents. The samples were characterized by scanning electron microscopy (SEM), Raman, and infrared spectroscopies (FTIR). Also, the SEM images showed distinct morphologies of the different three-dimensional structures of graphene, with optimal characteristics for their application in the removal and degradation of emerging contaminants. These studies are ongoing, but they already provide excellent results on methods of synthesis of 3D graphene. Also, it was possible to notice that the reducing agent used, ascorbic acid, is not adequate for reducing iron, making it impossible to decorate the 3D materials with nanoparticles. Thus, in thefollowing steps, it will be necessary to use a reducing agent capable of reducing iron, such as sodium borohydride.

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