Immobilization of C@TiO2 in Calcium Alginate Hydrogel for Photodegradation of Organic Pollutants

You, Xiyan (School: The Experimental High School Attached to Beijing Normal University)

Nano titanium dioxide is a widely used photocatalyst, but there are still two problems with it. On the one hand, nano titanium dioxide can only absorb ultraviolet light, so the utilization rate of sunlight is low. On the other hand, it is not easy to recycle, which will cause secondary pollution. In response to the above problems, this research proposed a carbon-coated titanium dioxide catalyst embedded in calcium alginate hydrogel to create a recyclable catalyst with high efficiency under sunlight. By controlling the thermal degradation of polyvinyl alcohol on the surface of nano titanium dioxide into carbon, a carbon coated nano titanium dioxide composite photocatalyst was prepared. Then a supported photocatalyst was prepared by embedding carbon coated nano titanium dioxide in calcium alginate hydrogel. The hydrogel-supported TiO2 catalyst was characterized by UV-Visible spectrometer, Infrared spectroscopy and electron microscope. The new TiO2 catalyst can not only absorb ultraviolet light below 400 nm, but also visible light above 400 nm. The product's photocatalysis ability was tested by letting it degrade the methyl orange solution under the sunlight. The calcium alginate/carbon coated nano titanium dioxide composite hydrogel is not only easy to be prepared with environmentally friendly materials, polyvinyl alcohol and calcium alginate hydrogel, but also is easy to recycle. The composite hydrogel pellets have relatively good photocatalytic activity, which catalyzed about 96% of the pollutants under the sunlight in 18 days. The new TiO2 composite catalyst is safe to use and has great potential on treatment of harmful pollutants.