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ABSTRACTS & PROCEEDINGS BOOK

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Synthesis and Characterization of SnO_2 Nanoparticles with Enhanced Photocatalytic Activity

Muhammet Hüseyin Orhan*, Handan Kamış, Bircan Haspulat-Taymaz

Abstract: For the demands of water and lack of drinkable water in our world, protecting of drinking water sources is the most important thing for mankind. But industrial wastes messes drinking waters with organic and inorganic dirtiness. Heavy metals, dyes, other toxic and non-toxic wastes not only threaten aquatic ecological system but also threaten mankind with mixing clear water sources. All of these threats forces scientists to research about how to eliminate these threats.

Traditional methods like adsorption, precipitation, membrane process, coagulation etc., based on transport toxins from one medium to another. Therefore, these methods inadequate for engineering because it makes secondary pollution that should be eliminated also. On the contrary, one of the advanced oxidation processes, photocatalyst; convert toxins to CO_2, H_2O, NO_x and other non-toxin organic and inorganic compounds. The most known photocatalyst TiO_2 is a low efficient photocatalyst owing to its fast recombination rate and needed high energetic photon to excite. An efficient photocatalyst should be excited easily with low energy and after excited, having slow recombination rate. In this context scientists focused on new photocatalysts. Tin dioxide (SnO_2) is n-type semiconductor photocatalyst.

In this work, SnO_2 nanoparticles have been successfully synthesized in aqueous medium in the presence of diethylene glycol via simple chemical precipitation method for the first time. The structural, morphological and chemical characterizations were investigated by using FT-IR, XRD, SEM and EDX methods.

The photocatalytic activity of the synthesized materials were investigated by the decolorization of methylene blue dye as a model compound under UV or halogen light irradiation as followed by spectrophotometric monitoring at room temperature. The synthesized SnO_2 nanoparticles show excellent photocatalytic activity under UV or visible light irradiation. The decolorization efficiency of MB dye solution after 20 min exposure time is 100% under UV light where efficiency of SnO_2 is only 56% after 120 min under visible light irradiation. Photocatalyst load is a little amount of photocatalyst (0.6 g/L). In this working, also different photocatalyst loading amounts have been done. At the end, reusage tested 5 times and it shows that our photocatalyst is photostable.

Keywords: textile wastewater treatment, photocatalysis, methylene blue, SnO_2

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