Co/TiO$_2$ nanoparticles: preparation, characterization and its application for photocatalytic degradation of methylene blue

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ABSTRACT

In this work, TiO$_2$ nanoparticles containing different amounts of cobalt were synthesized by sol-gel method using titanium (IV) isopropoxide and cobalt chloride as titanium and cobalt precursors, respectively. X-ray diffraction (XRD) results showed prepared samples include 100% anatase phase. The presence of cobalt in TiO$_2$ nanoparticle network was established by XRD, scanning electron microscopy equipped with energy dispersive X-ray microanalysis (SEM-EDX), Fourier transform infrared (FT-IR) and N$_2$ physisorption techniques. The increase of cobalt doping enhanced redshift in the diffuse reflectance spectra. The photocatalytic activity of the prepared samples was tested for degradation of methylene blue (MB) as a model of dye. Although the photocatalytic activity of pure TiO$_2$ was found to be higher than that of Co/TiO$_2$ samples under UV irradiation, the presence of 0.24% cobalt dopant in TiO$_2$ nanoparticles resulted in a photocatalyst with the highest activity under visible light.

Keywords: TiO$_2$ nanoparticle; Cobalt; Photocatalytic degradation; Methylene blue

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