



## Photocatalytic mineralization of methylene blue from water by a heterogeneous copper-titania nanocomposite film

Mohammad Hossein Habibi\*, Reza Kamrani

*Department of Chemistry, Nanotechnology Laboratory, University of Isfahan, Isfahan 81746-73441, Islamic Republic of Iran*

*Tel. +98 311 7932707; Fax: +98 311 6689732; email: habibi@chem.ui.ac.ir*

Received 19 October 2011; Accepted 16 February 2012

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### ABSTRACT

Copper-doped nanostructure titania film was successfully prepared using the sol-gel method. The phase structure, thermal, microstructure, and surface properties were characterized by X-ray diffraction (XRD), energy-dispersive X-ray spectroscopy, scanning electron microscopy, reflectance spectroscopy (Ultraviolet Diffuse Reflectance [UV-DRS]), and thermal analysis (Thermal gravimetric differential thermogravimetry [TG-DTG]). XRD showed that titania consisted of 92% anatase and 8% rutile crystalline phases. The results obtained have shown that these systems can degrade methylene blue (MB) as a model environmental pollutant in wastewater. The degradation rate of MB in the presence of copper-doped titania at optimized conditions was higher than that for bare titania. MB is almost completely mineralized to carbon dioxide, nitrate, and sulfate ion by the photocatalytic method. The results showed that no significant fraction of copper-titania residues was released from the film in water. This investigation will give a new insight into understanding the industrial textile dye photodegradation in aquatic environment.

*Keywords:* Dye removal; Photocatalytic degradation; Copper-doped titania film; Photocatalyst; Environmental pollutant; Methylene blue

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\*Corresponding author.