



Sol-gel synthesis, characterization of Fe/ZrO₂ nanocomposites and their photodegradation activity on indigo carmine and methylene blue textile dyes

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Abstract : Pure ZrO₂ as well as a series of Fe/ZrO₂ nanocomposites with varying iron content (1, 3, 5 and 8 %) have been successfully prepared using a modified sol-gel Pechini method. Phase structures, crystallite size and morphologies were studied by X-ray diffraction and scanning electron microscope techniques. The results showed that Fe-doping have a remarkable impact on both phase structure and crystallite size. Increasing the doping percentage reduced both the average crystallite size (from 30 to 18 nm) and lattice parameters of unit cells. Photocatalytic degradation of the samples against indigo carmine and methylene blue dyes has been evaluated. Perceptible impact of the iron loading on photocatalytic activity of Zr-Fe samples was observed. Photocatalytic degradation reaction rates of methylene blue and indigo carmine enhanced upon increasing the doping percent and found to fits a first order reaction.

Key words: Fe/ZrO₂, Sol gel, indigo carmine, methylene blue and photodegradation.

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