PHOTOCATALYTIC ACTIVITY OF $ZnFe_2O_4$ NANOPARTICLE CLUSTERS UNDER VISBLE LIGHT IRRADIATION

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Porous zinc ferrite ($ZnFe_2O_4$) nanoparticle clusters have been synthesized by the sol-gel auto-combustion method and the effect of excess iron on structural and visible light photocatalytic activity have been studied. X-ray diffraction (XRD), BET, scanning electron microscopy (SEM) and diffuse reflectance spectroscopy are used to investigate characteristics of synthesized $ZnFe_2O_4$ nanomaterials. The XRD patterns show that samples consist of single phase spinel structure with crystallite sizes below 50 nm. SEM analysis indicate that nanosized particles are grown together in clusters with size of several microns. The photocatalytic activity of synthesized ferrite nanomaterials to methylene blue (MB) under visible light irradiation is investigated. Results show that stoichiometric zinc ferrite exhibited higher photocatalytic activity (40%) than excess-iron sample (6%) under visible light irradiation by 3 hours. Lower photocatalytic activity of iron excess samples could be related to oxygen vacancies, which are created by restoring overall charge balance in the material and can behave as recombination centres.

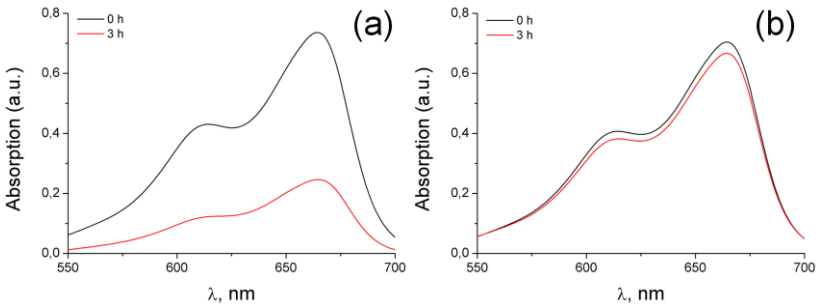

Fig.1 Photodegradation of MB over stoichiometric (a) and excess iron (b) $ZnFe_2O_4$ nanoparticle clusters under visible light irradiation

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