

Preparation of magnesium ferrite nanostructures by ultrasound-assisted method and investigation of Its Photo catalytic activity to remove methylene blue from aqueous solutions

Elaheh Taami¹, Yashar Azizian Klandaragh^{1,2,*}, Ali Khodayari³,
Gholamreza Pirgholi Givi²

¹Department of Physics, Faculty of Science, Mohaghegh Ardabili University, Ardabil, Iran

²Deptment of Engineering Sciences, Faculty of Advanced Technologies, Sabalan University of Advanced Technologies (SUAT), Namin, Iran

³Department of Chemistry, Faculty of Science, Mohaghegh Ardabili University, Ardabil, Iran

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Abstract

In this research, magnesium ferrite nanostructures have been prepared by ultrasound-assisted method, and for studying their structural, optical and magnetic characteristics, different methods such as X-ray diffraction (XRD), scanning electron microscopy (SEM), UV-Visible spectroscopy, and vibrating sampling magnetometer (VSM) have been used. The XRD pattern of the prepared magnesium ferrite nanostructures showed mixed cubic spinel phase. The SEM images showed nearly spherical form of nanostructures, and the average size of nanoparticles was estimated to be about 10-15 nm. The band gap value of the prepared magnesium ferrite derived from UV-visible absorption spectra was 2.8 eV, which in comparison with its bulk value, a blue shift (0.62 eV) due to the quantum confinement effect was observed. The hysteresis loop of the prepared sample obtained from the VSM analysis indicated that the prepared magnesium ferrite nanostructures exhibited a paramagnetic behavior at room temperature. The optimum pH value for methylene blue was 13. The intensity and spectrum of the light sources were engineered, and the most efficient status has been used for the experiment. The results showed that within 45 minutes, 99% of dye is degraded by magnesium ferrite nanostructures.

Keywords: Nanostructure, Magnesium ferrite, Ultrasound, Photocatalytic activity, Methylene blue

* Corresponding Author: Azizian@uma.ac.ir

