

Synthesis and characterization of magnetic oxide nanoparticles and corresponding thin films for wastewaters treatment

Lenuța CRINTEA (CĂPĂȚĂNĂ),¹ Viorica MUȘAT*,¹ Silviu POLOSAN,² Alina CANTARAGIU,³ Vasile BAȘLIU,³ Andreea DEDIU (BOTEZATU),⁴ and Rodica DÎNICĂ⁴

¹Laboratory of Chemical Nanotechnologies-LNC-CNMF, "Dunărea de Jos" University of Galati, 47 Domnească Street, RO-800008, Galati, Romania

²Multifunctional Materials and Structures Laboratory, National Institute of Materials Physics, Atomistilor 405 A, 077125, Magurele, Romania

³Cross-border Faculty, Cahul, "Dunărea de Jos" University of Galati, 47 Domnească Street, RO-800008, Galati, Romania

⁴Department of Physical-Chemistry and Environment, "Dunărea de Jos" University of Galati, 47 Domnească Street, RO-800008, Galati, Romania

Abstract. Industrial wastewater can be properly treated using nanotechnologies and nanomaterials. This paper presents the synthesis and characterization of three series of magnetic nanoparticles (MNPs) and corresponding thin films, used for the degradation of organic compounds and removal of heavy metals from industrial wastewater. The samples were obtained by co-precipitation from a ferric (Fe^{3+}) and ferrous (Fe^{2+}) ions solution in a molar ratio of 2:1, at temperatures between 80-95 °C. The characterization of the samples was performed by scanning electron microscopy (SEM), and X-ray diffraction (XRD) methods. The magnetic nanoparticles were deposited on glass substrates by the centrifugal coating technique and the optical and magneto-optical activity was investigated by UV-Vis spectroscopy and magnetic circular dichroism technique (MCD). The effect of the investigated samples on the decomposition under UV irradiation of organic dyes was monitored by UV-Vis spectroscopy. Our preliminary results have shown that the magnetite and maghemite MNPs can be effective in UV degradation of methylene blue (MB) dye.

Keywords: co-precipitation; magnetic nanoparticles; magnetic thin films; organic contaminants; wastewater.

*Corresponding author. E-mail address: Viorica.Musat@ugal.ro (Viorica Musat)