

# Preparation and characterization of iron (III) oxide nanoparticles and their application as nanopigments for formulation of a new anti - corrosive paint (anti - corrosive alkyd primer) based on alkyd resins

Tahereh Alaedini

[t.alaedini@ch.iut.ac.ir](mailto:t.alaedini@ch.iut.ac.ir)

Department of Chemistry

Isfahan University of Technology, Isfahan 84156-83111, Iran

H. Hadadzadeh, Prof. ([hadad@cc.iut.ac.ir](mailto:hadad@cc.iut.ac.ir))

F. Davar, Assistant Prof. ([davar@cc.iut.ac.ir](mailto:davar@cc.iut.ac.ir))

## Abstract

In this thesis, the single-phase  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> (hematite) nanoparticles have been successfully synthesized by a simple polymerizing-complexing sol-gel method. The morphology and particle size of the products were investigated by field emission scanning electron microscopy (FE-SEM) and X-ray diffraction (XRD). Further, the products have been characterized by fourier transform infrared (FT-IR) spectroscopy. The estimated band gap from the UV-Vis absorption spectra confirms the formation of nanoparticles. The FE-SEM images show that the particle size of as-prepared samples is from 20 to 40 nm. The effect of the heat treatment on the hematite phase evolution was also investigated. The vibrating sample magnetometer measurement (VSM) and superconducting quantum interference device (SQUID) show that the sample T1 possesses ferromagnetic property. For the first time, these nanoparticles have been modified by oleic acid (OA). In addition, the nanopigments were used for preparation of a new anti-corrosive paint based on alkyd resins. Finally, the anti-corrosive properties of the paint have been investigated by linear sweep voltammetry (LSV) potentiostatic and electrochemical impedance spectroscopy (EIS).

## Key words

Iron (III) oxide, Sol-gel, Electrochemical impedance spectroscopy, Anti-corrosive paint, Nanopigment, Linear sweep voltammetry.