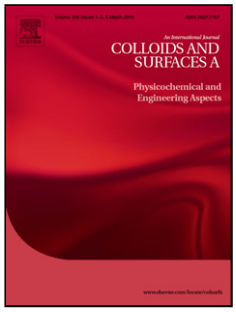

Title: Surfactant<!–<query id="Q1">Please check the doc head Ṙesearch paper, and correct if necessary.</query>–> dependence on physicochemical properties of magnetite nanoparticles

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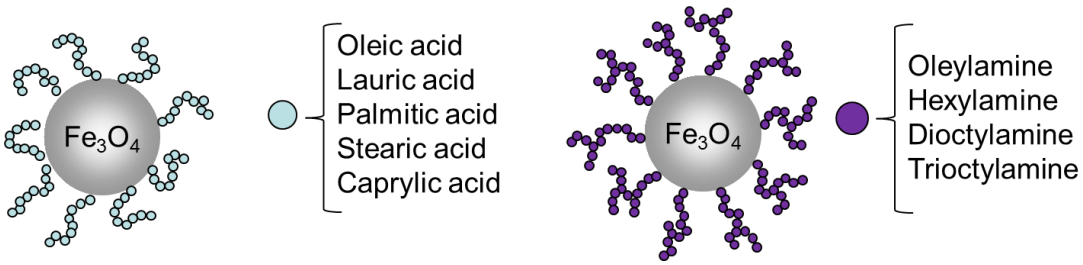
Surfactant dependence on physicochemical properties of magnetite nanoparticles

U. Klekotka[1], D. Satuła[2], S. Spassov[3], B. Kalska-Szostko[1]*

[1]Institute of Chemistry, University of Białystok, Ciołkowskiego 1K, 15-245 Białystok, Poland
[2]Faculty of Physics, University of Białystok, Ciołkowskiego 1L, 15-245, Białystok, Poland
[3] Section du Magnétisme Environnemental, Centre de Physique du Globe de l'Institut Royal Météorologique de Belgique, 5670 Dourbes, Viroinval, Belgium

*corresponding author
e-mail : kalska@uwb.edu.pl

Graphical abstract



Abstract

In presented paper magnetite nanoparticles (MNP), with various types of surface stabilizers has been fabricated. Nanostructures were obtained by thermal decomposition of $Fe(acac)_3$ precursor in organic solutions. Five types of long-chain carboxylic acids and four types of amines were used for stabilization of nanoparticles. It was also tested, how surfactant concentration influences on the nanoparticles morphology and its properties. Obtained nanoparticles were examined by X-ray diffraction, Transmission Electron Microscopy and Infrared spectroscopy. Magnetic properties of the nanoparticles were tested by Mössbauer spectroscopy and Vibrating Sample Magnetometry. Magnetization and Mössbauer measurements show how stabilizer layer influence the magnetic state of particles. It has been analyzed the importance of the C-C chain length, its spatial configuration or compound properties on magnetic state of the particles for few examples. From tested agents as a best, giving most even in shape and well distributed nanoparticles, hexylamine was selected.

Keywords: magnetite nanoparticles, surfactants dependence, magnetic properties, structural characterization, Mössbauer spectroscopy

Introduction

Magnetite nanoparticles, among others, can be relatively easily prepared without very sophisticated procedures, therefore large number of studies have been dedicated to them[1–5]. Another important advantage of these material is its potential application which originates in relatively low toxicity[6] and easy manipulation caused by magnetic interactions. The possibility of dragging these structures by external magnetic field makes them very attractive material to study as they can be