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New Multifunctional Materials Such As MCM – 41/ Fe_3O_4/ Folic Acid As Drug Delivery System

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Extended Abstract

Mesoporous magnetite nanoparticles are frequently used in biomedical (drug delivery system, MRI contrast agent, etc.) and environmental applications (removing heavy metals from wastewater, catalysts, etc.), due to their magnetic properties and high surface area.

In this work we present the synthesis and characterization of MCM – 41/ Fe_3O_4/folic acid as multifunctional drug delivery system. The preparation of multifunctional materials MCM41/Fe_3O_4 has been successfully synthetized via a facile three steps route. In the first step the Fe_3O_4 was synthetized by coprecipitation method. In the second step the Fe_3O_4 nanoparticles were coated with silica shell by sol gel method. The magnetic nanoparticles are usually coated with amorphous silica to avoid the sever aggregation between those nanoparticles Y. Chen, S. Mu (2014), L. Liu (2011), Y.L. Dong (2011). In the third step silica molecular sieve was grew on the surface of Fe_3O_4@ SiO_2. In order to determinate the structure and morphology of the synthesized multifunctional materials the following methods were used: X-ray diffraction (XRD), Brunauer-Emmett-Teller (BET), infrared spectroscopy (FTIR), high-resolution transmission electron microscopy (HRTEM) coupled with selected area electron diffraction (SAED) and energy dispersive spectrometry (EDS). The high-resolution transmission electron microscopy (HRTEM) and the Brunauer-Emmett-Teller (BET) analysis revealed a mesoporous structure of the MCM-41 material and also a core-shell structure of multifunctional materials MCM41/Fe_3O_4. Further to the synthesis of magnetic mesoporous system, folic acid was loaded into the mesopores. The delivery studies were done by UV-Vis spectorscopy, the synthesized multifunctional materials exhibiting good perspectives for using as drug delivery systems.

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