

Antibacterial Activity of Noble Metal Functionalized Magnetic Core-Zeolitic Shell Nanostructures

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Abstract : Functionalized magnetic core-zeolitic shell nanostructures were prepared by the hydrothermal and coprecipitation methods. The products were characterized by Vibrating Sample Magnetometer (VSM), X-ray powder diffraction (XRD), Fourier Transform Infrared spectra (FTIR), nitrogen adsorption-desorption isotherms (BET) and Transmission Electron Microscopy (TEM). The growth of mordenite nanoparticles on the surface of silica coated nickel ferrite nanoparticles at the presence of organic templates was well approved. The antibacterial activity of prepared samples was investigated by the inactivation of E.coli as a gram negative bacterium. A new mechanism was proposed to inactivate the bacterium over the prepared samples. Minimum Inhibitory Concentration (MIC) and reuse ability were studied too. TEM images of the destroyed microorganism after the treatment time were applied to illustrate the inactivation mechanism. The interaction of the noble metals with organic components on the surface of nanostructures studied theoretically and the results were used to interpret the experimental results.

Keywords : nickel ferrite nanoparticles, magnetic core-zeolitic shell, antibacterial activity, E. coli

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020