

عنوان مقاله:

Functionalization of Mesoporous CuS@mSiO₂ Core-Shell Nanoparticles by Cu(II) and Ni(II) Schiff Base Complexes: Synthesis, Characterization, Antibacterial Activity, Antibiotic Loading, DNA Cleavage and Enzyme Immobilization

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خلاصه مقاله:

Chloropropyltrimethoxysilane (CPTMS) was grafted on the surface of mesoporous CuS@mSiO₂ core-shell nanoparticles and then condensed with a tetradentate Schiff base, bis(salicylaldehyde)diethylenetriamine (H₂Saldien), to obtain CuS@mSiO₂-SB. The latter material was treated with Cu(II) or Ni(II) acetate salts and therefore metal Schiff base complexes were immobilized on mesoporous nanocomposites, CuS@mSiO₂-SB-Cu and CuS@mSiO₂-SB-Ni. The characterization of synthesized nanomaterials was carried out by Fourier-transform infrared spectroscopy (FT-IR), energy dispersive X-ray analysis (EDX), field emission scanning electron microscope (FESEM), transmission electron microscopy (TEM), low angle X-Ray diffraction (LA-XRD), Brunauer–Emmett–Teller (BET) surface area analysis, and thermogravimetric analysis (TGA). The results confirm a core-shell mesoporous structure for nanocomposites and prove the presence of all elements. Nanoparticles have spherical morphology with a mean diameter less than 100 nm. The synthesized nanocomposites were evaluated for antibacterial activity against Gram-positive (*S. aureus*) and Gram-negative (*P. aeruginosa*) bacteria and as carrier for streptomycin, gentamycin and polymyxin. The DNA cleavage activity of nanoparticles was also studied by agarose gel electrophoresis method. Nanocomposites were found to be good carrier for antibiotic, significantly inhibit bacterial growth and completely degrade the treated DNA. Also nanoparticles efficiently immobilized α-amylase enzyme

کلمات کلیدی:

Mesoporous,, ,Schiff Base,, ,Core-Shell,, ,Nanoparticles

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