

Abstract:

This work presents the preparation and physical properties of spinel nanoparticles and nanocomposites. All nanocomposites in diamagnetic matrix like chromites CoCr_2O_4 , CuCr_2O_4 , NiCr_2O_4 , ZnCr_2O_4 and ferrite MgFe_2O_4 were prepared using sol-gel method.

On the other hand, isolated nanoparticles such as MgCr_2O_4 , MnCr_2O_4 , CuCr_2O_4 , NiCr_2O_4 , and FeCr_2O_4 , were prepared using autocombustion a co-precipitation methods. CoFe_2O_4 and MgFe_2O_4 were prepared by microemulsion alkoxide method. This microemulsion method was used for the spinel nanoparticles preparation for the first time.

This work describes the influence of heat treatment temperature on the final particle size and influence of particle size on physical properties of material. The study of the influence of twovalent cation in the spinel structure on the magnetic properties of chromites was also carried out.

The final samples were characterized by XRD powder diffraction, Mössbauer spectroscopy, infrared and Raman spectroscopy, and HRTEM. The dependence of magnetization on applied magnetic field at constant temperature and ZFC (zero-field cooling) - FC (field cooling) measurement was carried out on the prepared sample.