

Method for synthesizing magnetic nanoscale  $\text{MeFe}_2\text{O}_4$  spinel, where  $\text{Me}=\text{Cu}, \text{Mg}, \text{Ni}, \text{Co}$  is carried out at high temperatures using the sol-gel self-combustion method with chelating agent and involves mixing aqueous solutions of divalent metal nitrates and iron(III) nitrate, forming sol, drying resulting precursor, and carrying out the self-combustion reaction. Aqueous solution of polyethylene glycol-2000 (PEG-2000) is used as both the chelating agent and the fuel in a molar ratio of metal:PEG-2000=1:1. The self-combustion reaction is carried out at a temperature of 350 °C, ensuring the formation of homogeneous spinel nanoparticles with sizes of 7-12 nm without significant agglomeration and with magnetization in the range of 17.8-27.8 e.m.u./g, and the synthesis of spinel structure is carried out in a single stage without additional calcination.