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Study of structural, morphological and magnetic properties Ag substituted cobalt ferrite nanoparticles prepared by honey assisted combustion method and evaluation of their antibacterial activity

M.K. Satheeshkumar^a, E. Ranjith Kumar^{b*}, Ch. Srinivas^{c*}, N. Suriyanarayanan^{d*}, M. Deepthy^c, C. L. Prajapat^e, T. V. Chandrasekhar Rao^e, D. L. Sastry^f

^aDepartment of Physics, Sri Guru Institute of Technology, Coimbatore 641110, Tamil Nadu, India.

^{b*} Department of Physics, Dr. N.G.P. Institute of Technology, Coimbatore 641048, Tamil Nadu, India

^{c*} Department of Physics, Sasi Institute of Technology and Engineering, Tadepalligudem 534101, Andhra Pradesh, India.

^{d*} Department of Physics, Government College of Technology, Coimbatore 641 013, Tamil Nadu, India.

^e Technical Physics Division, Bhabha Atomic Research Centre, Mumbai 400 085, Maharashtra, India.

^f Department of Physics, Andhra University, Visakhapatnam 530 003, Andhra Pradesh, India.

Corresponding author: ranjueaswar@gmail.com, srinivas.chintoju75@gmail.com, nsuri22@gmail.com

Abstract

Pure and Ag substituted cobalt ferrite nanoparticles (NPs) bearing the composition $(1-x)\text{CoFe}_2\text{O}_4 \cdot x\text{Ag}$ ($x = 0, 0.2$) were synthesized by a novel honey assisted combustion method in order to investigate their structural and magnetic properties along with their antibacterial activity. XRD patterns confirm the spinel phase of CoFe_2O_4 and the presence of silver (Ag) nanoparticles in the spinel network. The incorporation of Ag in CoFe_2O_4 spinel structure enhanced the size of the unit cell, resulting to higher value of lattice parameter (a) compared to the pure CoFe_2O_4 . The sintering process promoted the growth of the crystallite sizes (D). The crystallite sizes of the synthesized and annealed powders were found in the range of 24–41 nm. From the EDX studies, it seemed that the distribution of Ag nanoparticles was non-uniform. The saturation magnetization (M_s) and coercivity (H_c) of the powders were influenced by annealing as well as with the substitution of Ag. The highest value of saturation magnetization (60 emu/g) was obtained by the CoFe_2O_4 nanoparticles with the coercivity value 1358 Oe. The saturation magnetization and coercivity of Ag doped CoFe_2O_4 were less than that of pure CoFe_2O_4 . The present cobalt ferrite nanoparticles and Ag doped cobalt ferrite nanoparticles have showed good antibacterial activities. But Ag doped cobalt ferrite

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