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Magnetic, Mössbauer and hyperthermia properties of $Co_{1-x}Mn_xFe_2O_4$ nanoparticles

Sanghee Jung[1] · Jin Gyo Jung[1] · Hyunkyung Choi[1] · Minseon Kim[1] · In-Bo Shim[1] · Chul Sung Kim[1]

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Abstract

Hyperthermia is used to combat and reduce the effects of tumors. This study relates to $Co_{1-x}Mn_xFe_2O_4$ magnetic nanoparticles and their potential in hyperthermia treatment applications. $Co_{1-x}Mn_xFe_2O_4$ nanoparticles were prepared using the high-temperature thermal decomposition method, and the cubic spinel structure with the *Fd-3m* space group was confirmed through X-ray diffraction analysis. The self-heating temperature was measured using a magneTherm device, and the Mössbauer spectrum covers six lines of sites A and B. Consequently, the composition, particle size, and frequency conditions of magnetic nanoparticles capable of generating self-heating temperatures near the cancer cell death temperature of 42–43 °C were established.

Keywords Hyperthermia · Manganese substituted cobalt · Mössbauer spectroscopy