

# Mn-Zn ferrite nanoparticles for application in magnetic hyperthermia

**Hyung Joon Kim<sup>1\*</sup>, Sung Wook Hyun<sup>1</sup>, Hyunkyung Choi<sup>1+</sup>**

<sup>1</sup> Basic Materials & Chemicals R&D Center, LG Chem Research Park, Daejeon 34122, Republic of Korea

<sup>2</sup> Department of Physics, Kookmin University, Seoul, Republic of Korea

\*E-mail: rushmouse777@gmail.com

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$Zn_{0.8}Mn_{0.2}Fe_2O_4$  nanoparticles (NPs) were prepared by a high temperature thermal decomposition. The crystal structure was found to be cubic spinel with space group  $Fd-3m$  and lattice constant ( $a_0$ ) to be 8.4103 Å by using a Rietveld refinement analysis. The saturation magnetization ( $M_s$ ) and coercivity ( $H_c$ ) of the NPs were 83.2 emu/g and 32.7 Oe, respectively. The self-heating temperature of the NPs was found to be 110 °C at 50 kHz under an applied field of 250 Oe. NPs were used for hyperthermia therapy in nude mice. SKBR3 breast cancer cells were xenografted to the abdomen of two nude mice. It was effective for breast cancer cell death, but tumor sizes were not increased. We obtained the Mössbauer spectra (A, B sites) of the NPs under zero magnetic field and under high external field 50 kOe at 4.2 K. The magnetic hyperfine field ( $H_{hf}$ ) of the NPs under high external field 50 kOe at 4.2 K were analyzed as 513 and 432 kOe for A and B sites, respectively.

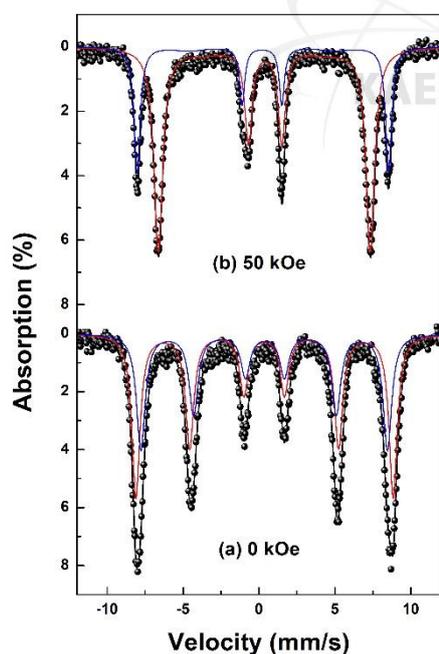


Fig. 6. Mössbauer spectra of  $Zn_{0.8}Mn_{0.2}Fe_2O_4$  (a) at 4.2 K under zero magnetic field and (b) at 4.2 K with 50 kOe external field.

