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THU-NA-P78

Thermal properties of $Co_{0.5}Zn_{0.5}Fe_2O_4$ nanoparticles for hyperthermia applications

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Thermal properties of $Co_{0.5}Zn_{0.5}Fe_2O_4$ nanoparticles for hyperthermia applications

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The $Co_{0.5}Zn_{0.5}Fe_2O_4$ nanoparticles were prepared by high temperature thermal decomposition method. The crystal structure was determined to be cubic spinel with space group Fd-3m and the lattice constant (a_0) of 9.01 Å from Rietveld refinement analysis. Based on the Scherrer equation and SEM, the average size of nanoparticles was obtained to be 10 nm. The magnetic properties were characterized using a vibrating sample magnetometer (VSM). The saturation magnetization (M_s) and coercivity (H_c) of the nanoparticles were 78.7 emu/g and 21.0 Oe, respectively. To confirm thermal property, the nanoparticles were measured by magneTherm device at physiological safe range of frequency and amplitude. The self-heating temperature of nanoparticles determined to be 104, 119 ℃ at 50, 112 kHz and 25 mT, respectively. [1,2] In addition, we obtained Mössbauer spectra of nanoparticles at various temperatures ranging 4.2 to 700 K. Specific absorption rate (SAR) of nanoparticles depend on magnetization and spin canting angle.

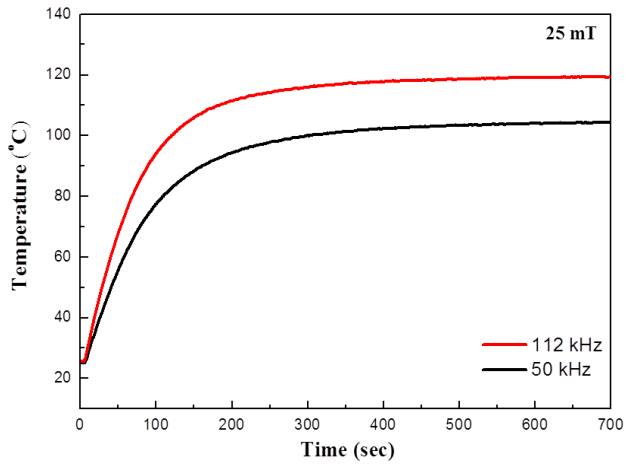

Fig 1. The self-heating temperature of solid state nanoparticles at 50, 112 kHz and 25 mT.

Reference

[1] C. Martinez-Boubeta at al., Scientific reports. **3**, 1652 (2013)
[2] J. Lee at al., Nature Nanotechnology. **6**, 7 (2011).