Abstract Submitted
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Interrogation of $Co_xZn_yNi_zFe_2O_4$ ferrite nanoparticles for insight into specific power loss for medical hyperthermia[1] ZAFRULLAH JAGOO, GREGORY KOZLOWSKI, Wright State University, ZAFER TURGUT, Air Force Research Laboratories, EVGENY REBROV, Queen's University — Magnetic nanoparticles (MNPs) have shown to be viable candidates as heat sources for magnetic hyperthermia under an alternating magnetic field. The present work investigates heating characteristics of sol-gel processed ferro-magnetic $Co_xZn_yNi_zFe_2O_4$ (ferrite) nanoparticles with different magnetic properties. The nanoparticles were irradiated by a radio-frequency magnetic field through a 5-turns coil using a 1.2 kW heating system with variable frequency in the 295-315 kHz range and a maximum current output of 100 A. Higher specific power losses were measured for nanoparticles that had lower coercivities. The advantage of having a high specific power loss for clinical applications is that a minute amount of nanoparticle has to be introduced in the body to adequately destroy malignant tumor cells.

Name	Grain Size (nm)	M_r (emu/g)	M_s (emu/g)	H_c (Oe)	SPL_{100A} (W/g^2)
$Ni_{0.5}Zn_{0.5}Fe_2O_4$	48.7	2.85	47.5	42.2	84 ± 2
$Co_{0.4}Ni_{0.4}Zn_{0.2}Fe_2O_4$	46	3.29	26.2	75.3	28 ± 3
$NiFe_2O_4$	42.9	3.47	14.8	146	17.0 ± 0.5
$CoFe_2O_4$	34.5	7.01	22.2	626	0.64 ± 0.05

[1]PMI 2 Connect

Zafrullah Jagoo
Wright State University

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