**Co-Zn FERRITES AS THE MRI AGENTS**

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**Abstract**

In our research of suitable colloidal dispersion as the contrast agent for the magnetic resonance imaging (MRI) technique the cobalt-zinc-ferrite with the composition Co0.5Zn0.5Fe2O4+ is investigated. Among complex oxide nanomaterials, the ferrites and manganites exhibit the highest relaxivities (the ability to accelerate the spin-spin relaxation). We have previously found exceptionally high $r_2$ values for the La1-xSrxMnO3 nanoparticles with XRD mean size 25 nm [1], namely the hybrid La1-xSrxMnO3 nanoparticles coated by 15 nm silica shell with covalently attached fluorescein provided $r_2 = 580 \text{ s}^-1\text{mmol(Mn)}^-1\text{L}$ at 0.5 T and 540 s$^-1\text{mmol(Mn)}^-1\text{L}$ at 4.7 T at the temperature of 20 °C [2]. The particles of the ferrite were prepared by a co-precipitation method followed by a thermal treatment in the range 500 – 600 °C to gain dimension variability of the sizes 10 – 40 nm. The XRD analysis of the samples revealed single-phase composition with cubic spinel structure. Particles of the ferrite were successfully covered by the silica shell with average width of the shell about 20 nm evidenced by TEM. The colloidal stability was confirmed by the method DLS including the hydrodynamic size measurement with the value of diameter of the specimen from the range of 45 – 200 nm. The magnetic field dependence on relaxation rate $T_2$ was carried out at fields 0.5, 1.5, 3 and 4.7 T, respectively, at room temperature. The dependence of relaxivity $r_2$ on temperature was measured at the field $B_0 = 0.5 \text{ T (20 MHz)}$. The support by the projects GACR P204/10/0035, GACR P108/11/0807 and Research Program AVOZ10100521 is gratefully acknowledged.
