

Efficiency of multiple applications of magnetic hyperthermia in lung tumor cells using aminosilane coated iron oxide nanoparticles

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Magnetic hyperthermia, mediated by superparamagnetic iron oxide nanoparticles (SPIONs), has been shown as a promising alternative therapy for oncology treatment [1]. In the present work, aminosilane functionalized-SPIONs ($\text{Fe}_3\text{O}_4\text{-NH}_2$) were obtained by the coprecipitation method and functionalized with aminosilane [2,3]. The morphology, structural, colloidal and magnetic properties of $\text{Fe}_3\text{O}_4\text{-NH}_2$ were evaluated. The nanoparticles $\text{Fe}_3\text{O}_4\text{-NH}_2$ presented 12 ± 3 nm estimated by XRD and TEM measures. From zeta potential, we observed a isoelectric point at 8.0 mV, indicating that under physiological conditions (pH 7.4), the surface charge positive, than increase the cellular uptake. The nanosystem present 75 emu.g^{-1} saturation magnetization and specific loss power of 26 W.g^{-1} at 200 G and 307 KHz. No toxicity was observed for health (Balb-c) and lung tumor (A549) cells at concentrations up to 1000 $\mu\text{g/mL}$. Magnetic hyperthermia in vitro study was performed with lung tumor cells ($[\text{Fe}_3\text{O}_4\text{-NH}_2]=100 \mu\text{g/mL}$; 200 G and 307 KHz), demonstrating significant results in five alternating magnetic field application cycles.

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References

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