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Anisotropic Magnetic Nanostructures For Enhanced Hyperthermia D. TORRES, Texas State Univ., R. DAS, J. ALONSO, M.H. PHAN, H. SRIKANTH, Univ. of South Florida — Magnetic nanoparticles assisted hyperthermia is one of the most promising techniques for cancer treatment. By the use of magnetic nanoparticles in an external AC magnetic field, one can target a specific tumor location and deliver toxic doses of heat to the tumor area without damaging the surrounding healthy tissue. Magnetite is typically used in biomedical applications due to its biocompatibility, but the heating efficiency of the commonly used magnetite nanoparticles is not enough to obtain the best results in cancer treatment. Therefore, novel magnetic nanostructures are required in order to improve the heating efficiency. Recently, it has been proposed by different groups that it is possible to increase the heating efficiency of the nanoparticles by tuning their effective anisotropy. Considering this, we have synthesized high aspect ratio magnetic nanorods with increased effective anisotropy. A thorough structural and magnetic characterization has revealed high crystallinity and optimal magnetic properties of these nanorods. The hyperthermia response shows that by increasing the aspect ratio from 5 to 11, their heating efficiency is increased by 150%. In addition, we have observed that a good alignment of the nanorods with the magnetic field ensures the best heating results. Hence, these nanorods appear to be promising candidates for cancer treatment with magnetic hyperthermia.

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