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The Effects of Magnetic Nanoparticles on Magnetic Fluid Hyperthermia MONRUDEE LIANGRUKSA, Department of Engineering Science and Mechanics, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, 24061, USA, RAVI KAPPIYOOR, Department of Engineering Science and Mechanics, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061, USA, RANJAN GANGULY, Department of Power Engineering, Jadavpur University, Kolkata 700032, India, ISHWAR PURI, Department of Engineering Science and Mechanics, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, 24061, USA — Magnetic fluid hyperthermia (MFH) is a cancer treatment in which biocompatible magnetic nanoparticles are dispersed into a tumor and heated by an external AC magnetic field. Over a period of time, the tumor cells are locally heated, leading to hyperthermia which damages and kills the tumor cells with minimal damage to the surrounding normal tissue. The applied magnetic field must be high enough to induce hyperthermia for a specified magnetic particle concentration in the tumor but also lies within the safe limit for human exposure. Six materials, barium ferrite, cobalt ferrite, iron-cobalt, iron-platinum, magnetite and maghemite, are considered as candidates for MFH use. We find that fcc iron-platinum, magnetite and maghemite generate useful treatment temperatures and, when included in a ferrofluid, can produce sufficient and effective MFH for which optimal conditions are explored.

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