Magnetic Heating of Iron Oxide Nanoparticles with Alternating Magnetic Field for Hyperthermia Applications

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Abstract

The current therapies available to treat cancer patients are surgical operation and chemo therapy. The drawbacks are the side effects caused by these therapies. Hyperthermia is a treatment technique based on deactivation of cancer cells by raising the temperature in the range of 43 °C and 48 °C and has gained attention as an alternative therapy for cancer treatment. Iron oxide nanoparticles have become important in heating applications such as hyperthermia treatment for cancer therapy. It has ability to produce heat around a small region, when an external alternating magnetic field is applied. It has a potential advantage over other heat treatment because there is no systemic buildup in organs therefore, large doses are possible. In this work, we evaluated the heating capability of the magnetic iron nanoparticles by varying the magnetic field strength and applied AC current frequency using COMSOL Multiphysics® software.

Reference

R.E Rosensweig,"Heating magnetic fluid with alternating magnetic field", Journal of Magnetism and Magnetic Materials, Vol.252, pp. 370-374 (2002)

Figures used in the abstract

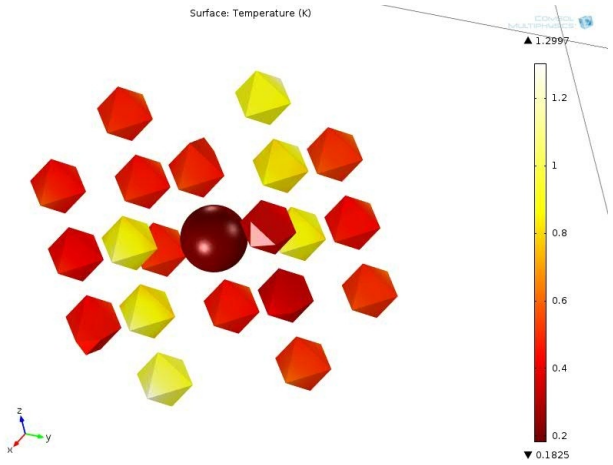

Figure 1: Thermal profile of magnetic nanoparticle at 100MHz.