

Implantable Magnetic-Dielectric Composites for Prolonged Hyperthermia Treatment of Hepatic Lesions

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Abstract

The inefficiency and the low success rates of surgical resection and side effects of chemotherapy used in the treatment of hepatocellular carcinoma have elicited substantial research interest in alternative methods for treatment. Here we report the use of magnetic-dielectric composite of Chromium doped Iron Oxide ($\text{Cr}_{0.2}\text{Fe}_{1.8}\text{O}_3$) – Polyvinylidene Fluoride (PVDF) for the hyperthermia treatment of hepatic lesions. The magnetic oxide was prepared by sol-gel processing route and the formed phase was characterized by X-Ray Diffraction. The composite was formed in Acetic Acid media where the magnetic oxide was embedded in the PVDF matrix. Surface morphology of the formed composite was studied using Scanning Electron Microscopy and biocompatibility was ensured by MTT-Assay studies. *In silico* studies were carried out using Finite Element Method simulation to depict the conditions at which hyperthermia treatment may occur in the hepatic tissue.

Keywords:

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expressed as a percentage of the viability of the control culture. The cell viability (%) was calculated according to the following equation:

$$(\%) = \frac{570}{570} \times 100\%$$

as in Equation 3.

$$\mu^{-1}(\quad) \frac{\sigma}{\epsilon_0} = 0$$

