Commentary

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The Nanoring Morphology as a Promising Approach for Advanced Therapy

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DESCRIPTION

The use of Magnetic NanoRings (MNRs) in Magnetic HyperThermia (MHT) will be discussed in this article. For MHT protocols, this material platform offers complete control over the operating temperature. We will present and analyze temperature (T) vs time (t) curves obtained from suspensions containing MNRs that were exposed to an externally supplied AC magnetic field. Additionally, T vs t curves for various morphologies will be shown and discussed. It will be demonstrated that asymptotic temperatures can be effectively adjusted to fall within the necessary temperature range for cell apoptosis by altering the shape of nanosized magnetic materials. Furthermore, an equation based on well-established theories of heat transmission across a boundary material layer is the first to model the temporal dependence of the suspension's temperature. The phenomenological suggestion that is frequently used in the literature (Box-Lucas approach) and the resulting expression are analytically equivalent. In conclusion, the talk's content is very pertinent to the field of MHT with original data analysis, which has a significant impact on the field of biomagnetic materials as well as those protocols that support MHT as a safe therapy in everyday clinical settings.

Based on magnetic nanoparticles, Magnetic HyperThermia (MHT) is an alternate cancer treatment. MHT calls for the application of an external alternative magnetic field with a specific frequency and amplitude in addition to the usage of a magnetic nanomaterial. The purpose of this study is to compare the uncommon ring nanomorphology with the typical spherical nanomorphology.

The paper will cover the chemical synthesis of the NanoRings (NRs) that make up the magnetite phase. Additionally, the NRs' structural, morphological, and magnetic characteristics will be discussed. This Paper will demonstrate and discuss the magnetic hyperthermia performance of nanorings with an exterior diameter of less than 50 nm.

CONCLUSION

The assessed magnetic and hyperthermia data strongly favor the use of the magnetic nanoring morphology instead of the standard spherical morphology as the first choice material for magnetic hyperthermia cancer therapy. Recent evaluations of both magnetic properties and hyperthermia performance indicate that magnetic nanorings exhibit significantly enhanced capabilities compared to traditional spherical nanoparticles. Their unique morphology contributes to improved heating efficiency under an alternating magnetic field, making them a more promising and effective candidate for magnetic hyperthermia-based cancer treatments. The ring-shaped structure not only supports superior magnetic responsiveness but also offers better control over heat generation, which is critical for targeting and destroying cancer cells while minimizing damage to surrounding healthy tissues. As a result, nanorings are emerging as a preferred alternative over conventional spherical particles in the development of next-generation cancer therapies.