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Enhanced magnetic hyperthermic efficiency of ferrite based nanoparticles

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Hyperthermia is one of many techniques used destroy cancerous cell. It uses the physical methods to heat certain organ or tissue delivering an adequate temperature in an appropriate period of time, to the entire tumor volume for achieving optimal therapeutic results. Magnetic Metal ferrites nanoparticles (MFe_2O_4 where M = Mn, Zn, Ni, Co, Mg etc) are one of the most potential candidates for hyperthermia due to their tunability, biocompatibility, chemical stability and notable ability to mediate high rate of heat induction. However, to obtain the desirable properties for these applications, it is important to optimize their chemical composition, structure and magnetic properties. These properties are mainly sensitive to cation distribution of tetrahedral and octahedral sites. Among the ferrites, zinc ferrite ($ZnFe_2O_4$) and Manganese ferrite ($MnFe_2O_4$) is one of a strong candidate for hyperthermia application because Mn and zinc has a non-magnetic cation and therefore the magnetic property is determined only by the cation distribution of iron, which provides a better platform to manipulate or tailor the properties. In this talk, influence of doping and surfactant towards cation re-distribution leading to an enhancement of magnetic properties of ferrite nanoparticles will be demonstrated. The efficiency of heat generation in association with the enhanced magnetic property is also well discussed in this talk.

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