# TOWARDS COMPREHENSION OF THE TRUE MAGNETIC PROPERTIES OF MAGNETITE AT NANOSCALES FOR BIOMEDICAL APPLICATIONS


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Magnetite nanoparticles (MNPs) are being intensively considered for biomedical applications, especially as thermal seeds in magnetic hyperthermia for over a decade. However, conflicting results have been reported and a meaningful practical solution for neither the size of thermal seeds nor the ac magnetic field operating conditions for effective heat dissipation is yet to be achieved. The reasons for the same have been the difficulties in the synthesis of monodispersed MNPs ranging between few nanometers to twenty nanometers and the true magnetic properties of nanometer scale magnetite. However, in the last few years, considerable improvements have been made in the development of techniques to prepare monodispersed MNPs with wide range of diameters. But, the inability to determine the true magnetic properties of MNPs still hinders finding the viable solution for magnetic hyperthermia. In this context, an attempt has been made to determine the true properties of magnetite nanoparticles by isolating the same by coating with varying thicknesses of silica layers. The interaction-free nature and magnetic properties of the system thus obtained was analyzed and their behavior was compared with the bulk counterpart.

In this talk, application of magnetic nanoparticles for magnetic hyperthermia, synthesis of magnetite particles and their performance as thermal seeds, role of size and conformation on heat dissipation, experimental evaluation of magnetic interaction between thermal seeds, and the intrinsic properties of magnetite nanoparticles will be discussed.



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