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Monodisperse Magneto-Fluorescent Bifunctional Nanoprobes for Bioapplications[1] HONGWANG ZHANG, HENG HUANG, ARND PRALLE, HAO ZENG, SUNY at Buffalo — We present the work on the synthesis of dye-doped monodisperse Fe/SiO_2 core/shell nanoparticles as bifunctional probes for bioapplications. Magnetic nanoparticles (NP) have been widely studied as nano-probes for bio-imaging, sensing as well as for cancer therapy. Among all the NPs, Fe NPs have been the focus because they have very high magnetization. However, Fe NPs are usually not stable in ambient due to the fast surface oxidation of the NPs. On the other hand, dye molecules have long been used as probes for bio-imaging. But they are sensitive to environmental conditions. It requires passivation for both so that they can be stable for applications. In this work, monodisperse Fe NPs with sizes ranging from 13-20 nm have been synthesized through the chemical thermal-decomposition in a solution. Silica shells were then coated on the Fe NPs by a two-phase oil-in-water method. Dye molecules were first bonded to a silica precursor and then encapsulated into the silica shell during the coating process. The silica shells protect both the Fe NPs and dye molecules, which makes them as robust probes. The dye doped Fe/SiO_2 core/shell NPs remain both highly magnetic and highly fluorescent. The stable dye doped Fe/SiO2NPs have been used as a dual functional probe for both magnetic heating and local nanoscale temperature sending, and their performance will be reported.

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