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Silica-coated magnetite nanoparticles carrying a high density polymer brush shell of hydrophilic polymer

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Possessing inherently favorable superparamagnetic properties, magnetite nanoparticles (MNPs<20 nm) have attracted much research interest over recent years for extensive applications. Integrating the properties of MNPs and high-density polymer brushes in one structure requires sophisticated synthetic designs and effective chemical approaches. We present a simple and straightforward strategy for the fabrication of hydrophilic-polymer-capped magnetite-core–silica-shell nanohybrids with well-defined structure employing reverse microemulsion technique and surface-initiated Reversible Addition-Fragmentation chain Transfer (RAFT) polymerization. The high density polymer brushes allow a precise patterning of the magnetic nanohybrids with a tunable interparticle distances ranging from 20 nm to 80 nm by controlling the molecular weight of polymer. The high structural precision provides a near stand-alone state of the MNPs in the nanohybrids with effectively inhibited magnetic interaction as shown by SQUID measurements.

Biography

Yingying Cai is pursuing her PhD in Macromolecular Chemistry from the Georg-August-Universität Göttingen, Germany. Her research focuses on the development of novel silica coated nanomaterials incorporating surface chemistry and polymerization for various applications.

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