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Multifunctional PEG-carboxylate copolymer coated superparamagnetic iron oxide nanoparticles for biomedical application

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Abstract

Biocompatible magnetite nanoparticles (MNPs) were prepared by post-coating the magnetic nanocores with a synthetic polymer designed specifically to shield the particles from non-specific interaction with cells. Poly(ethylene glycol) methyl ether methacrylate (PEGMA) macromonomers and acrylic acid (AA) small molecular monomers were chemically coupled by quasi-living atom transfer radical polymerization (ATRP) to a comb-like copolymer, P(PEGMA-*co*-AA) designated here as P(PEGMA-AA). The polymer contains pendant carboxylate moieties near the backbone and PEG side chains. It is able to bind spontaneously to MNPs; stabilize the particles electrostatically via the carboxylate moieties and sterically via the PEG moieties; provide high protein repellency via the structured PEG layer; and anchor bioactive proteins via peptide bond formation with the free carboxylate groups. The presence

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