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A new drug carrier: Magnetite nanoparticles coated with amphiphilic block copolymer

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The preparation and characterization of 4 nm magnetite nanoparticles coated with amphiphilic block copolymers of poly(ethyl methacrylate)-b-poly(2-hydroxyethyl methacrylate) (PEMA-b-PHEMA) by surface initiated Atom Transfer Radical Polymerization (ATRP), which can act as new potential carriers for hydrophobic targeted drug delivery. This new material exhibits following significant advantages: (1) Well-proportioned magnetite nanoparticles and narrow disperses amphiphilic block copolymer material (PDI=1.10) were prepared by convenient method, (2) It is satisfied that the magnetic properties of Fe_3O_4 -polymer are significant for the separation of products and the channel off of targeted drug, (3) The amount of drug carried into the core-shell Fe_3O_4 @PEMA-b-PHEMA depends linearly on the length of hydrophobic segment of block copolymer, then the chain length of polymer can be controlled by ATRP and (4) Drug release behavior depends on the nature of block segment and of different kind of drugs such as hydrophobic or hydrophilic.

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