

## COATING OF MAGNETIC PARTICLES BY ANCHORING OF POLYMERS

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A majority of medicinal and other biological applications of magnetic particles requires covering of its surface to prevent undesirable interactions. The most widely used coating with dextran is based only on weak interactions of hydroxy groups of saccharide units. We describe here the attachment of polymers to the particle through groups forming strong chelate bonds to surface metal oxides. The oxides used were magnetite ( $\text{Fe}_3\text{O}_4$ ), maghemite ( $\gamma\text{-Fe}_2\text{O}_3$ ) and perovskite (manganite  $\text{La}_{0.75}\text{Sr}_{0.25}\text{MnO}_3$ ) as nanoparticles and their aggregates or microparticles. Phosphates, bisphosphonates, 1,2-dicarboxylate were used for binding to oxide.

The preparation of coated oxides consists basically of two steps: polymerization of suitable monomer and binding of a compounds or polymer with anchoring group to the oxide. The following variants of the reactions and their order were used:

(i) The monomer – commercial (Sipomer 200, penta(methylethylene glycol) methacrylate phosphate, Rhodia) or prepared by acryloylation of the oxide modified with [(2-aminoethyl)hydroxymethylen]bisphosphonic acid – was bound to the oxide and then polymerized in solution of an appropriate monomer with radical initiation.

(ii) Oligo(vinyl alcohol-*alt*-maleic acid) with peroxide end groups was attached to the oxide and used for initiation of polymerization of monomers in solution.

(iii) The free thiol groups of bissulfanyl succinic acid bound to oxides were used as chain transfer agent in solution polymerization of hydrophilic monomers

In other variants the first step was polymerization and the oxide is then modified with a polymer containing anchoring groups:

(iv) The radical polymerization of *N*-(2-hydroxypropyl)methacrylamide in the presence of bissulfanylsuccinic acid as a chain transfer reagent followed by modification of the oxide.

(v) The solution polymerization was initiated with oligo(vinyl alcohol-*alt*-maleic acid) with peroxide end groups followed by the oxide modification.

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