PREPARATION OF MAGNETIC HYDROPHOBIC NANOPARTICLES FOR CHOLESTEROL REMOVAL

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Cholesterol is a major ingredient of the plaque that collects in the coronary arteries and causes coronary heart diseases: if too much cholesterol circulates in the blood it can build up in the lining of the arteries and form atheromas or fatty acid deposits. Recently, ischemic heart diseases have attracted attention among vascular disease in Western Countries. Statistical studies of mortality and precise pathology studies indicate that acute cardiac death has been increasing every year of which about 80% are attributed to myocardial infarction. Large-scale epidemiological surveys in Western countries have revealed close correlation between the incidence of ischemic heart diseases and serum cholesterol levels.

Novel magnetic hydrophobic nanoparticles with an average size of 386 nm utilizing N-methacryloyl-L-phenylalanine methyl ester (MAPA) as a hydrophobic monomer were prepared by surfactant free emulsion polymerization of 2-hydroxyethyl methacrylate (HEMA) and MAPA conducted in an aqueous dispersion medium. MAPA was synthesized using methacryloyl chloride and L-phenylalanine methyl ester. Magnetic nano-polyhydroxyethylmethacrylate-co-methacryloylamido-phenylalanine [mag-nano-p(HEMA-MAPA)] nanoparticles were investigated for specific removal of cholesterol. Magnetic nanoparticles characterized by FTIR, ESR, Zeta-size and zeta-potential, SEM, and elemental analysis. Specific surface area of nanoparticles was found as 580 m²/g. Cholesterol adsorption experiments were performed in a batch experimental set-up. Adsorption medium was methanol or intestinal mimicking solution. There was a very low non-specific cholesterol adsorption onto the plain mag-nano-p(HEMA) nanoparticles. High adsorption values were observed for cholesterol when using the mag-nano-p(HEMA-MAPA) nanoparticles. Up to 90% of the adsorbed cholesterol was desorbed. The adsorption-desorption cycle was repeated 10 times using the same nanoparticles. There was no significant loss in the adsorption capacity.