"Nanostructured surfaces"

Magnetic nanocomposite with grafted N-aminometylene-phosphonic groups as a preconcentration phase of metal ions

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The fastest growing area of use of phosphonates is creation of nanoscale and nanostructured materials where P-comprising fragments immobilized on the surface of various carriers. These materials are applied in medicine address delivery of drugs and are promising for creating ion-conducting membranes, selective sorbents, nanoreactors. Magnetic nanoparticles have attracted much attention due to their strong magnetic response combined with easy regulated properties via modification of surface. That is why we report an approach for preparation magnetic nanosorbent with covalently grafted N-aminometylenephosphonic groups.

Fe_3O_4 nanoparticles were modified by Kabachnic-Fields reaction similar to the procedure reported for the preparation of modified silica [1]. Nitrogen-having starting materials were obtained by two routes: freshly preparing magnetite reacted with dopamine hydrochloride ligand; according Stober method, Fe_3O_4 was added to ethanol solution APTES with TEOS. Than magnetites with covalently bonded aminogroup were functionalized with phosphonic acids and formaldehyde. The composite materials were characterized by FTIR, X-ray diffraction (XRD), scanning and transmission electron microscopy (SEM/TEM), VSM measurements.

Prepared magnetic solid phases containing phosphonic groups were tested for recognition of europium (III) ions to investigate the rationality and feasibility of these sorbents for rare earth metals. According to the results as-prepared core-shell structure is an ideal support due to its large surface area (155m2/g), good adsorption time (5 min) and easy retrievement from large volumes of aqueous solutions. The nanoadsorbents synthethised via dopamine groups showed highest adsorption capacity recognition to Eu(III) at pH 6,5-7.0.

1. *Zaitsev V.N., Vassilik L.S., Evans J.* Synthesis and structure of the grafted layer on silicas chemically modified by aminophosphonic acids // Russ. Chem. Bull. - 1999. **- 48.** - P. 2315-2320.