

Physico-chemical nanomaterials science

Nanostructure of adsorption layer of anionic polyacrylamide on the mixed silica-titania oxide surface

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The adsorption properties of mixed silica-titania (ST) oxide in relation to anionic polyacrylamide (PAM) were examined. The ST oxide was composed of 20% of SiO₂ and 80% of TiO₂ (ST 80). The SiO₂-TiO₂ mixed oxide were prepared using AACVD (Aerosol Assisted Chemical Vapor Deposition) method [1]. The electrokinetic measurements indicated that ST 80 oxide was characterized by point of zero charge (pzc) at pH 8 and isoelectric point (iep) at pH 3. Two polymeric samples were applied as adsorbates, namely polyacrylamide with weight average molecular weight 14 000 kDa and content of anionic carboxyl groups 20% (PAM 14.0_20%), as well as PAM with molecular weight 15 500 kDa and anionicity 50% (PAM 15.5_50%). Effects of solution pH, PAM molecular weight and content of carboxyl groups in macromolecules were studied.

The obtained results revealed that the PAM adsorption occurred within whole range of studied solution pH values (i.e. 3-9), even under electrostatic adsorbent-adsorbate repulsion conditions. The greatest adsorbed amount of polyacrylamide was obtained at pH 3 at which slightly negatively charged polymeric coils adsorb compactly on the positively charged solid surface. The adsorption level was higher for PAM containing 50% of carboxyl groups.

1. Kakihana M., Invited review "sol-gel" preparation of high temperature superconducting oxides // J. Sol-Gel Sci. Technol., - 1996-6.-P. 7-55.

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