

Nanocomposites and nanomaterials

A role of free silanol groups of nanosilica surface in interaction with polyvinylpyrrolidone

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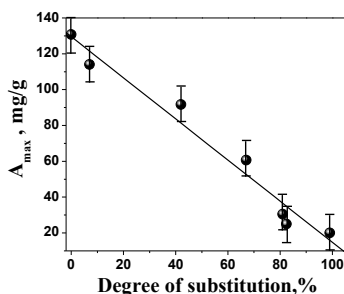
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The active sites of the surface of silica nanoparticles are silanol groups, which are divided into free and hydrogen-bonded ones.

The purpose of this work was to determine the role of the free silanol groups of nanosilica in interaction with macromolecules of polyvinylpyrrolidone (PVP).

The abundance of silanol groups on the surface of the nanoparticles was changed by substitution on trimethylsilyl groups by reaction with hexamethyldisilazane. Adsorption of PVP on nanosilica surface was carried out from a water-ethanol (1: 1) solution.

The dependence of the maximum PVP adsorption on the degree of hydrophobization of nanosilica surface is shown in Figure.



It's been shown that free silanol groups play a principal role in adsorption of polyvinylpyrrolidone onto nanosilica surface. The value of the maximal adsorption (monolayer capacity) on hydrophobic silica, where the surface silanol groups are completely replaced by trimethylsilyl ones, has been found to be approximately 6.5 times smaller than that in the case of the parent hydroxylated sample.

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