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Silica nanoparticles surface-modified with thiacalixarenes selectively adsorb oligonucleotides and proteins

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Abstract

We prepared silica nanospheres 360 nm in diameter surface-modified with p-ter-butylthiacalix[4]arenes containing amine, carboxyl, and guanidinium groups. We found that these silica nanoparticles selectively adsorb model oligonucleotides and proteins. The particles modified with the macrocycle containing guanidinium fragments selectively adsorbed long-chain oligonucleotides and those modified with the macrocycle containing amine groups adsorbed BSA and hemoglobin with pH-dependent selectivity. We compared this behavior with that of silica nanoparticles carrying amine and carboxyl groups, and concluded that both electrostatic interactions and specific binding are responsible for the observed selectivity. © 2013 Springer Science+Business Media Dordrecht.

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Keywords

Adsorption, Biomacromolecules, Nanoparticles, Nanoscale coating, Silica, Surface