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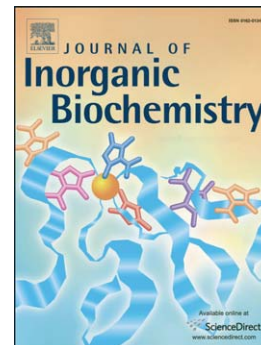
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Charge and agglomeration dependent in vitro uptake and cytotoxicity of zinc oxide nanoparticles

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Abstract

The influence of the surface charge and the state of agglomeration of ZnO nanoparticles on cellular uptake and viability are investigated. For this purpose, ZnO nanoparticles were synthesized by colloidal routes and their physicochemical properties were investigated in detail. Three different surface modifications were investigated, involving coatings with the amphiphilic polymer poly(isobutylene-*alt*-maleic anhydride)-graft-dodecyl, mercaptoundecanoic acid, and L-arginine, which provide the nanoparticles with either a negative or a positive zeta-potential. The hydrodynamic diameters and zeta-potentials of all three nanoparticle species were investigated at different pH values and NaCl concentrations by means of dynamic light scattering and laser Doppler anemometry, respectively. The three differently modified ZnO nanoparticle species of similar sizes were also investigated in respect to their cellular uptake by 3T3 fibroblasts and HeLa cells, and their effect on cell viability.

Keywords

inorganic nanoparticles  
organic surface coating  
cytotoxicity

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