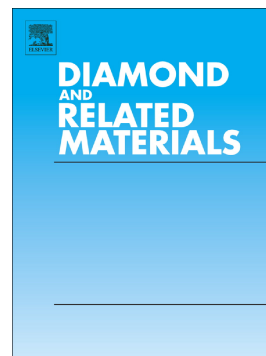


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Stabilization of detonation nanodiamonds hydrosol in physiological media with poly(vinylpyrrolidone)

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Abstract

A simple method of stabilization of detonation nanodiamonds in isotonic aqueous-saline media was found, being a solution of an actual task for biomedical applications. The stable colloid of detonation nanodiamond particles with negative ζ -potential in isotonic medium can be produced by complexes formation with poly(vinylpyrrolidone). The mean size of the complexes is 30-35 nm. The stability conditions of the complexes were defined and their structure was determined by small-angle neutron scattering. The obtained hydrosols of nanodiamond particles are stable in physiological medium and can be used in biological researches and in medicine as drug carriers.

Keywords: detonation nanodiamond; hydrosol; poly(vinylpyrrolidone); polymer; isotonic medium.

Abbreviations

DND – detonation nanodiamond
 EDL – electrical double layer
 DLVO – Derjaguin, Landau, Verwey, Overbeek (theory)
 PBS – phosphate-buffered saline
 HPHT – high-pressure high temperature
 FND – fluorescent nanodiamond
 PEG – polyethylene glycol
 BSA – bovine serum albumin
 HSA – human serum albumin
 PVP – poly(vinylpyrrolidone)
 DLS – dynamic light scattering
 FTIR – Fourier-transform infrared (spectroscopy)
 SANS – small-angle neutron scattering

1. Introduction

Nanodiamonds of detonation synthesis (detonation nanodiamonds, DND) attract increasing attention as commercially available substances, and their chemical inertness and nontoxicity provides wide prospects for their use in biology and medicine [1-7]. According to modern concepts, the DND

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