

Searching Ways of Increase in Stability of Detonation Nanodiamond Water Suspensions

Shilova O.A.*, Golikova E.V.*, Nicolaychuk N.I.*, Dolmatov V.Yu.[†]

**Grebenschikov Institute for Silicate Chemistry of RAS, Nab. Makarova, 2, 199034 St. Petersburg, Russia*

†FSUP SKTB "Technolog", Sovetskii pr., 33a, 192076 St. Petersburg, Russia

Detonation nanodiamond (DND) are extremely prospective filler for synthesis of diverse composite materials. DND small additives to electrolytes or polymers improve quality of metal-diamond galvanic coatings and polymer-diamond films. High biological activity is an integral feature of DND. Introduction of the DND in sol-gel systems increases their biostability to the mold fungi. Earlier it has been shown by us; the use of DND water suspension is preferable for synthesis of composite coatings by a sol-gel method or by means of electrochemical processes. In this case the surface of the DND is stronger reactive. However a problem of insufficient stability of DND water suspensions appears at storage of the suspensions as well as at their chemical feeding. It can cause nonreproductivity of composites properties. Effective routes of the increasing stability of DND's water dispersions have not developed till now.

The purpose of the given paper was increase in stability of DND water suspensions due to using approaches of colloidal chemistry and sol-gel technology. Water suspensions at various concentrations of DND have been characterized by the techniques of microelectrophoresis and photometry, pH-method, sedimentation test and potentiometric titration.

To increase stability of DND water suspensions the hypothesis of colloidal processing of the suspensions by diluted silica sols has been put forward and approved. It was supposed that desegregation of DND nanoparticles in suspension, stabilization of the aggregates size at a nanolevel as well as increasing their sediment and aggregate stability can be provided due to formation of fragments of an inorganic polymer network around of DND particles. Determination of optimum conditions of silica sols synthesis has been realized. Different factors (tetraethoxysilane concentration, sol aging and pH) were varied.

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