

# **Use of Detonation Diamonds in Sol-gel Processing of Innovative Materials**

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Sol-gel processing is technology of preparing technically valuable inorganic and hetero-organic polymers and materials (glass, ceramic, catalysts, adsorbents, and other composites) on the basis of transformation of homogeneous solutions in sols and further in gels. Some useful parameters of these materials can be changed essentially by involving detonation diamond in sols as the ultradisperse additive. Here technological features of introduction of detonation diamond in the silicate, silicophosphate and epoxysilicate sol-gel systems intended for preparation of protonconductive thin-layer membranes are described. Moreover formation of protective biologically active coatings on glass, marble and on a surface of fine powders are considered. Results of research of fine structure and physical properties of xerogels obtained as well as biostability of the generated coating to the some kinds of the micromycetes prevailing in an environment of megacities are submitted. It is discovered that detonation diamond is the template agent. Like this, introduction of only 3 wt.% of a diamond powder results in reorganization of fine structure of the sol-gel derived silicophosphate nanocomposites. Such materials containing from 3 up to 10 wt. % of a diamond powder have higher proton conductivity that does their more attractive for hydrogen fuel elements of an average temperature range. Surface modification of fine alumina as well as glass or marble by the silicate and epoxysilicate coatings containing minor additives of detonation diamond raises their biostability with respect to the most aggressive mushrooms causing destruction of stone constructions. The alumina differing by biologically active surface can be used to manufacture more biostable components of dry inks, concretes etc. The epoxysilicate coatings inhibiting development of micromycetes are prospective as protective coatings for stone monuments to preserve a cultural heritage.