

Nanocomposites and nanomaterials

Hybrid organic-inorganic membranes with bifunctional surface layer

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The separation properties of the ultrafiltration membranes depend on the structure of the active layer. As it was determined earlier, polysilsesquioxane and polysiloxane surface layers with amino groups deposited on ceramic membranes via sol-gel method consist of spherical particles about 80 nm in size [1,2]. However, it turns out that when the surface aminogroups of the silica nanoparticles are accompanied with alkyl groups (for example, methyl), the methyl groups dilute the aminopropyl groups uniformly, opening for uptake of higher amounts of heavy metal ions. Therefore, in this work we focused on depositing bifunctional amino-groups containing active layers on the surface of ceramic membrane substrates, using different structure-forming agents (tetraethoxysilane or 1,2-bis(triethoxysilyl)ethane). In fact, we pursued double objective in creating bifunctional layers: we aimed both to increase the sorption of heavy metal ions by the surface amino groups and to improve the hydrolytic stability of the amino groups. One more important aspect is that the introduction of alkyl co-ligand can increase the hydrophobicity of the membranes, which would deteriorate membranes performance during filtration. Thus it is very important to keep a proper proportion of amino/alkyl groups in the surface.

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1. Tomina V.V., Stolyarchuk N.V., Melnyk I.V., Kochkodan V.M., Zub Yu.L., Chodosovskaja A., Kareiva A. Surface functionalization of ceramic membranes with 3-aminopropyl groups using the sol-gel method // Protection of Metals and Physical Chemistry of Surfaces.-2016.-**52**, N 1.-P. 55-60
2. Tomina V.V., Melnyk I.V., Stolyarchuk N.V., Nazarchuk G.I., Zub Yu.L. Peculiarities of obtaining sol-gel modified membranes for heavy metal ions removal // Book of abstracts of Ukrainian–German Symposium on Physics and Chemistry of Nanostructures and on Nanobiotechnology.-2015.- P. 16