

# "Nanostructured surfaces"

## Sorption of Ag (I) ions by SH-functionalized planar ceramic membranes

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The application of inorganic membranes for selective adsorption removal of heavy metals and radionuclides from waste and surface water is of particular interest. From this perspective, researchers got interested in the techniques of preparing such membranes using sol-gel method to create nanolayers of silica with three-dimensional ordered pore system. Such membranes were suggested to use in separation technology, catalysis and optical technologies [1-3].

In the current research sol-gel method based on the reaction of hydrolytic copolycondensation of tetraethoxysilane (TEOS) or 1,2-bis(triethoxysilyl)ethane (BTESE) with 3-mercaptopropyltrimethoxysilane (MPTMS) was used to functionalize ceramic membranes with  $\equiv\text{Si}(\text{CH}_2)_3\text{SH}$  groups. According to SEM, there is observed the formation of active layers of about 0.5 $\mu\text{m}$  thick and composed of SH-containing nanoparticles 60-70 nm in diameter, the gaps between which determine their porosity. According to filtration studies in Amicon Stirred Ultrafiltration Cell using model Ag(I) nitrate solutions, the behavior of the membrane functionalized with BTESE acting as a structuring agent in the separation process depends on the degree of functionalization, with sorption separation mechanism prevailing at low functionalization degree (72.2  $\mu\text{g}/\text{cm}^2$ ) and steric membrane mechanism of Ag(I) removal at higher degree of functionalization (505.7  $\mu\text{g}/\text{cm}^2$ ). Whereas for the samples modified with TEOS acting as a structuring agent, steric membrane mechanism dominates.

Authors are grateful to NATO Science for Peace Program SPS.NUKR.SFP 984398 and the project of SFFR of Ukraine with BSFFR (Belarus) for the financial support of the work.

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