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NEW SILVER NANOCOMPOSITES BASED ON PHOSPHOROUS-CONTAINING COPOLYMERS

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Abstract. The copolymers of tris(diethylamino)diallylaminophosphonium tetrafluoroborate (DAAP-BF_4-SO_2) and chloride (DAAP-Cl) with N-vinylpyrrolidone (VP) have been obtained by free radical polymerization.

New silver nanocomposites based on synthesized copolymers have been obtained by the reduction of $AgNO_3$ with $NaBH_4$ in copolymer solution. Reaction proceeds via formation of the stable dark brown sols, from which silver nanocomposites were separated. The content of silver in the composites was found to be in the range from 8 to 11 wt%. The ratio of silver nitrate, reducing agent and copolymer significantly affects the silver concentration in nanocomposites.

UV- spectroscopy, SEM and XRD techniques were used to characterize the formation of silver nanoparticles in copolymers. The average silver particle size ranged from 10 to 20 nm, with the corresponding UV-vis absorption peak position at 395-405 nm (Figure 1).

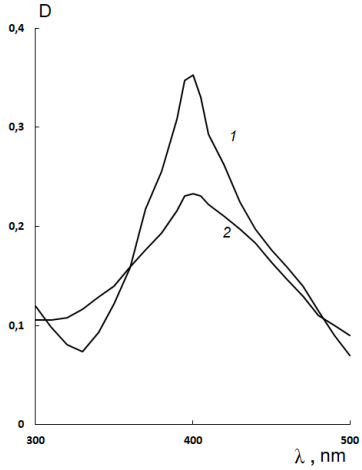

Figure 1. UV extinction spectra of nanocomposite: *1* – DAAP-Cl-VP, water solution, $C=7.5\cdot10^{-3}$ mol/l; *2* – DAAP-BF_4-VP, alcoholic solution, $C= 5\cdot10^{-4}$ mol/l.

SEM results prove the obtaining of nanocomposites with regular narrow-dispersed distribution of silver nanoparticles in polymer matrice. Nanoparticles of spheric and elliptic forms were obtained.

Antibacterial action of new silver nanocomposites was studied. New silver nanocomposites have a significant antimicrobial activity against both Gram positive and Gram negative microflora.

The study was funded by Russian Foundation for Basic Research and Government of the Perm Region according to the research project № 19-43-590019 r_a.

Analytical, spectroscopic, and biological studies were performed at the "Research of materials and substances" collective Center of PFRC UB RAS.