

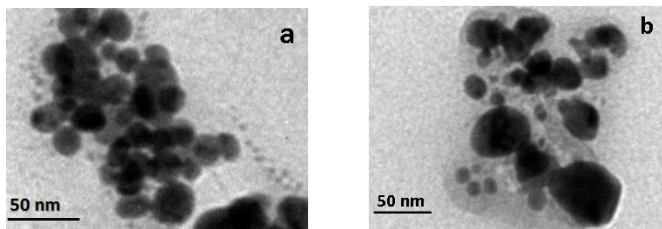
“Nanostructured surfaces”

Preparation of colloidal nanosilver in the presence of sodium polyacrylate by electrochemical method

R.V. Topchak, O.I. Kuntiyi

Lviv Polytechnic National University, 12 Bandera Str., Lviv, Ukraine 79013,
E-mail: agpd@ukr.net

The work is devoted to the study of electrochemical synthesis of silver nanoparticles in the form of colloids stabilized by polyacrylic anion. The synthesis was carried out in aqueous solution of AgNO_3 at hydrodynamic conditions in the presence of polymeric stabilizer (sodium polyacrylate (NaPA)). The influence of cathodic potential, content of AgNO_3 , concentration ratio $[\text{AgNO}_3]:[\text{NaPA}]$, the size of silver nanoparticles and their aggregation stability have been investigated. Reduction of silver in the solution occurs due to "hydrated electrons" of cathode [1]. It is shown that in the potential range of $-0.6 \dots -0.8$ V are formed discrete nanostructures of silver. It was established that with increasing of cathodic potential (up to -0.8V) is observed a tendency to the agglomeration of nanoparticles (a) and their scatter on sizes. Thus, if at the potential -0.6V formed particles with size of 25 nm (Figure 1 a), then at -0.8V - 50 nm (b).



TEM images of nanosilver obtained electrochemically from an electrolyte: 0,01 M AgNO_3 + 0,1 M NaPA; E $-0,6$ (a), $-0,8$ V (b)

In case of simultaneous use of stabilizing agent sodium polyacrylate (NaPA) in the system allows to obtain of stable over the time nanosilver colloidal solutions. The resulting solution kills of mycobacterium *Staphylococcus aureus* for one hour.

1. Giri N., Natarajan R.K., Gunasekaran S., Shreemathi S. FTIR, ^{13}C NMR and UV Visible Study of blend behavior of sodium polyacrylate nanosilver composite // World Journal of Science and Technology. – 2011. – 7. – P. 54-61.