

“Nanostructured surfaces”

Applying of gold and silver on a silicon in the environment DMSO and DMF

M.V. Shepida, L.V. Sus

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

Nowadays, one of the effective and universal method of applying nanostructured metals on the silicon surface is a galvanic replacement method [1, 2]. Any metal with a more positive standard electrode potential than silicon can be used in this method [3].

The deposition of nanoparticles of gold and silver on the surface of silicon in solutions of organic aprotic solvents (DMSO and DMF) has been investigated. This environment the prevents flow of by-chemical and electrochemical processes as shown in [4]. This provides a relatively even distribution of precipitable metal nanoparticles in size on the substrate surface.

The influence of precipitable metal ion concentration in the solution, temperature and duration of galvanic replacement of the morphology of the surface, geometry of the particles and their size distribution has been studied. It is established trend to the formation of nano-sized particles of gold and silver with a decrease in concentration of ions $[\text{AuCl}_4]^-$ and $[\text{AgDMFn}]^+$, reduction of duration of the process and increase of the temperature. It is shown that combining these parameters on the silicon surface we can precipitate discrete single particles, their agglomerates or films.

1. *Sayed S.Y., Wang F., Malac M., Meldrum Al., Egerton R.F., Buriak J.M.* Heteroepitaxial Growth of Gold Nanostructures on Silicon by Galvanic Displacement // ACS Nano. – 2009. – **3**. – P. 2809–2817.
2. *Ego T., Hagihara T., Morii Y., Fukumuro N., Yae S., Matsuda H.* AFM Analysis for Initial Stage of Electroless Displacement Deposition of Silver on Silicon Surface // ECS Transactions. – 2013. – **50**. – P. 143–153.
3. *Djokic S.S.* Galvanic Deposition of Copper, Silver and Gold on Silicon Surfaces from Fluoride Free Aqueous Solutions // ECS Transactions. – 2017. – **75**. – P. 15–25.
4. *Dobrovetska O.Ya., Kuntiyi O.I., Zozula G.I., Saldan I.V., Reshetnyak O.V.* Galvanic Deposition of Gold and Palladium on Magnesium by the Method of Substitution // Materials Science. – 2015. – **51**. – P.418–423.