

## INFLUENCE OF PH ON CATALYTIC REDUCTION OF Au(III) BY HYDROGEN AT GOLD NANOPARTICLES

SOLOVOV Roman, ABKHALIMOV Evgeny, ERSHOV Boris G.

*A.N. Frumkin Institute of Physical Chemistry and Electrochemistry of RAS, Moscow, Russian Federation  
S. Kurnakov Institute of General and Inorganic Chemistry RAS, Moscow, Russian Federation*

### Abstract

At the present time a huge number of techniques of preparation of gold nanoparticles having different size distributions are known. Generally these methods are very well investigated and described. The used reducing agent in these techniques can be any substances with high reduced potential. The used reducing agents in these techniques can be any substances with high reducing potential: sodium borohydride, sodium aluminum hydride, sodium citrate, etc. However, these reducing agents have some disadvantages. The main disadvantage is the undesirable reaction products increasing the ionic strength of the solution or even causing aggregation and sedimentation of the sol. In this regard, we have chosen the «chemically pure» reducing agent - hydrogen - and studied the influence of some parameters on catalytic reduction Au (III) to Au (0). In our work the usable as catalysts-seed and high stable during a long time gold nanoparticles have been obtained by photochemical method in the aqueous medium. The obtaining gold sol was monodispersed and had an average crystallite diameter ( $4,6 \pm 0,8$ ) nm. The hydrodynamic diameter and absolute value of the zeta-potential were ( $6,1 \pm 1,6$ ) nm and 78,3 mV respectively. The catalytic reduction Au (III) with hydrogen on the surface of the seed nanoparticles Au(0) carried out at various pH. The constancy of the pH was maintained by different buffer systems. The formation of new layers of reduced gold on seed nanoparticles was accompanied by an increasing in the absorption of the plasmon resonance of gold. Henry's law constant has allowed us in the start of the process to consider the zero order of the reaction on product Au(0). Thus, constants were measured catalytic reduction at different pH. It has been found that the dependence of the constant pH was linear.

**Keywords:** Gold nanoparticles, catalysis on surface of nanoparticles, sol, spectra of absorption, plasmon resonance

### ACKNOWLEDGEMENTS

This work was supported by the Russian Found of Basic Research (Project Grant Nos. 12-03-00449-).

**Author did not supply full text of the paper/poster.**