## Physico-Chemical nanomaterials science

# The influence of stability of silver complexes with glycine on the nanoparticles size

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Nanoparticles of Ag(AgNps) have some distinctive properties for practical application such as antibacterial, catalytic, optical, sensoric etc. The aim of this work was to study the composition, stability of Ag-Gly complexes according to the IUPAC procedure; to evaluate the influence of the composition, the stability and relative concentration of complexes (AgNps precursors) in a solution on processes of reduction with $NaBH_4$ and on SPR spectra; to ascertain the effect of the mentioned factors on the size of the obtained AgNps, their distribution according to the size, their solutions stability; to study the effect of the processes of glycine substitution for hydrogen sulfide in the stabilising shell on SPR spectra; to estimate the sensor properties of the analysed systems. Using the pH-potentiometric titration method and Hyperquad 2006 programme the stability constants of Ag- Gly complexes were defined. And using these data and Species programme the diagrams of the $Ag^+$ ions distribution among the complexes particles for the solutions with the different ratios of Ag:Gly (1-100) and pH values (2-12) were obtained. It was revealed that in such systems complexes $Ag(HGly)^+$(lgK=0.73**)**, Ag(Gly)($lgK_1$=3,46), $Ag(Gly)_2^-$ $lgK_{2=}$3,35) are formed. According to the diagrams we defined the conditions (pH, Ag:Gly) of domination of a particular composition complex in a solution from which the AgNps monodisperse colloidal solutions were obtained by reduction with $NaBH_4$. The solutions mentioned above were studied by electron spectroscopy in visible SPR spectra and the obtained Ag Nps were studied by TEM. When reducing the silver-glycine system, where $Ag^+$:Gly=1:20, pH=7, Ag was distributed among three particles $Ag^+$(77%), AgGly (11,3%), $Ag(HGly)^+$ (8,18%) and AgNps of three dimensional ranges were formed: aggregates (λmax=566nm), <d>=12nm (λmax=427nm), <d>=8nm(λmax=375nm). As a result of reduction of the system with pH=10 ($Ag^+$(0,1%), AgGly (3,32%), $AgGly_2^-$( 96,51%) ) we obtained AgNps only of one size <d>=8nm (λmax=382nm) in such system. It was shown that the size and the quantity of AgNps size scales, their relative content in a solution depend on the yields of $Ag^+$ complexes with glycine precursors.

AgNps of the smallest size are formed from the more stable complexes.