SIZE-CONTROLLED PREPARATION OF GOLD NANOPARTICLES BY USING GUANOSINE MONOPHOSPHATE

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Gold nanoparticles in the 1–10 nm size range unique optical, electronic, magnetic, and catalytic properties. AuNP-based nanotechnology are useful in a wide variety of applications such as Raman and fluorescence spectroscopy, biosensing, tumor treatment and drug delivery. In this work we report a size-controlled synthesis of gold nanoparticles using guanosine monophosphate (GMP). GMP consists of the phosphate group, the pentose sugar ribose, and the purine nucleobase guanine. We have found, that GMP can act as both a reducing and a stabilizing agent in process of synthesizing gold nanoparticles.

Solutions of GMP and HAuCl4 were mixed at pH 5, and after 24 h the color the color change of the samples changed from light yellow to orange. A maximum at 350-550 nm appeared in the absorption spectra of the samples, corresponding to the complex between $AuCl_4^-$ and GMP. IR-spectroscopy date have shown, that gold ions in aqueous solution form complexes due to chelation of N(7)-O (6) atoms of guanosine monophosphate, which is consistent with the data described in the literature [1].

For the synthesis of nanoparticles from GMP:Au(III) complexes, an alkaline pH of 9.5 was reached by adding of NaOH solutions, then the samples were heated for 30 minutes. After that, new absorption band appeared in the spectra; for GMP:Au ratio below than 4 : 1 – an intensive surface plasma resonance band around 520 nm and for GMP:Au ratio higher than 4 : 1, an intense surface plasmon resonance band at about 520 nm and for the GMP:Au ratio above 4 : 1, a new band at about 385 or 340 nm, which correspond to gold nanoclusters. Samples with a GMP:Au ratio of 8:1-50:1 exhibited bright blue fluorescence at 420 nm (λex 360 nm).

1. *Hadjiliadis N., Pneumatikakis G., Basosi R.* Gold complexes of purine and pyrimidine nucleosides // J. of Inorganic Biochemistry. 1981. Vol. 14, Nr 2. P. 115–126.

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