Mendeleev 2021

XII International Conference on Chemistry for Young Scientists

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St Petersburg University

XII International Conference on Chemistry for Young Scientists “MENDELEEV 2021“

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Book of abstracts contains theses of plenary, keynote, oral and poster presintations which were presented on **Mendeleev 2021**, the XII International Conference on Chemistry for Young Scientists. The Mendeleev 2021 Conference hold in Saint Petersburg (September 6–10, 2021).

Abstracts presented in the original edition

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GOLD NANOPARTICLES SYNTHESIS IN THE PRESENCE OF CARBON NANODOTS

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Gold nanoparticles (Au NPs) and their assemblies are among the most studied nanomaterials, with many promising applications especially in medicine and biosensors. These are based on their peculiar optical properties, which in turn strongly depend on the nanoparticles shape and size. Therefore, development of the synthesis of Au NPs with tunable morphology is of unflagging interest. A variety of reducing and stabilizing agents for the preparation of Au NPs have been explored.

In this study, we investigated the possibility of the synthesis of Au NPs via the reduction of $HAuCl_4$ with carbon nanodots (C-dots) – carbonaceous nanoparticles bearing hydrophilic functional groups at the surface. It was suggested that those groups could induce the reduction of Au(III) into Au(0) and stabilize the obtained Au NPs against aggregation.

We synthesized the C-dots via hydrothermal treatment of aqueous solutions of ascorbic acid, glucose, and glucosamine. Other conditions being the same, the C-dots from ascorbic acid and glucose induced rapid formation of Au NPs upon mixing with an aqueous solution of $HAuCl_4$, whereas loose precipitate was formed within several days in the presence of the C-dots from glucosamine. The ratio between the C-dots and the gold precursor strongly affected the size of the produced Au NPs, as confirmed by the electronic absorption spectra (Fig. 1) and TEM images of the product. Slow sedimentation of the obtained Au NPs in the gravity field (in contrast to conventional Au NPs of the same size) evidenced their binding at the C-dot surface.

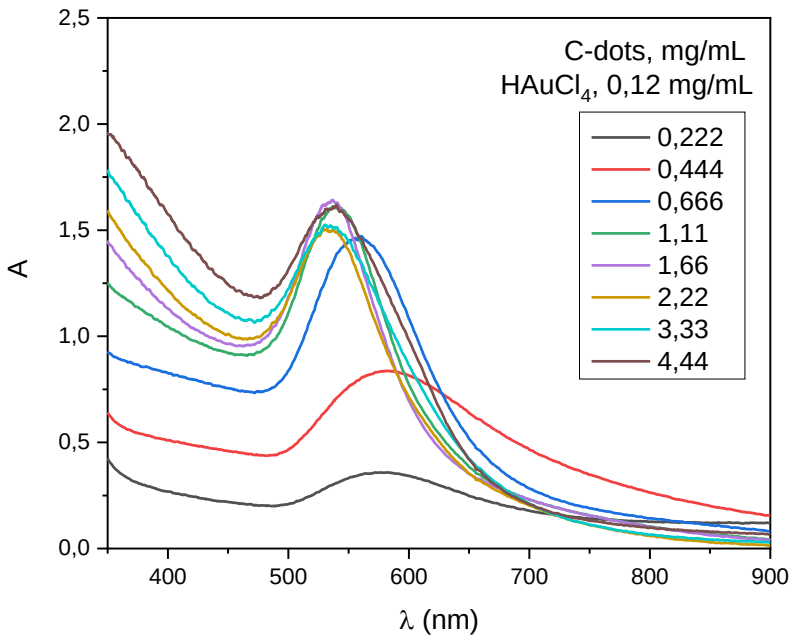

Figure 1. Electronic absorption spectra of the Au NPs synthesized at different concentrations of the glucose-based C-dots.

Hence, the reduction of $HAuCl_4$ in the presence of C-dots is an interesting method to prepare Au NPs with potentially tunable size and shape. Importantly, in contrast to other analogous methods, the obtained nanoparticles can be easily isolated from the dispersion via centrifugation.

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