

EuChemS-DAC Study Group / Task Force Annual Report for 2022-2023

Study Group / Task Force Name: Nanoanalytics

Study Group / Task Force Head and Affiliation: Prof. Dr. Sergei Shtykov (Head), Saratov State Univ., Russia

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Objectives:

The aim of the Nanoanalytics Task Force is to start a dialog within the analytical chemistry community on the concept of Nanoanalytics. There is however a need to explain in a clear way what Nanoanalytics does, what the outputs of Nanoanalytics are and what the terminology means.

- A concept and definition of Nanoanalytics.
- The most important types and classifications of nanotechnologies used in the chemical analysis.
- The scope of applications of Nanoanalytics in Chemical Analysis.
- Preparation of a textbook and/or manuals for students.

Activities and Outputs in 2022-2023 (e.g. reports, publications, seminars, meetings):

Shtykov S.N. develops fundamental and applied aspects of nanoanalytics.

1. Labuda J., Johnston L.J., Mester Z., Gajdosechova Z., Goenaga-Infante H., Barek J., Shtykov S. Analytical chemistry of engineered nanomaterials: Part 1. Scope, regulation, legislation, and metrology (IUPAC Technical Report). Pure Appl. Chem. 2023. V. 95. № 2. P. 133-163. – a result of IUPAC project <https://doi.org/10.1515/pac-2021-1001>

2. Khabibullin V.R., Chetyrkina M.R., Obydenny S.I., Maksimov S.V., Stepanov G.V., Shtykov S.N. Study on doxorubicin loading on differently functionalized iron oxide nanoparticles: Implications for controlled drug-delivery application // Int. J. Mol. Sci. 2023. V. 24. 4480. <https://doi.org/10.3390/ijms24054480>

Khlebtsov N.G. Head of the scientific group developing the theory of plasmonics and the synthesis of gold and silver nanoparticles of different morphology and the practice of their use in bioanalysis.

1. Khlebtsov N.G., Khlebtsov B.N., Kryuchkova E.V., Zarkov S.V., Burov A.M. Universal determination of gold concentration in colloids with Uv–Vis spectroscopy. J. Phys. Chem. C 2022. V. 126. 19268–19276.

2. Khanadeev V.A., Simonenko A.V., Grishin O.V., Khlebtsov N.G. One-shot laser-pulse modification of bare and silica-coated gold nanoparticles of various morphologies. Nanomater. 2023. V. 13. 1312.

<https://doi.org/10.3390/nano13081312>

3. Evstigneeva S.S., Chumakov D.S., Tumskiy R.S., Khlebtsov B.N., Khlebtsov N.G. Detection and imaging of bacterial biofilms with glutathione-stabilized gold nanoclusters. Talanta. 2023. V. 264. 124773

<https://doi.org/10.1016/j.talanta.2023.124773>

4. Khlebtsov N.G., Dykman L.A., Khlebtsov B.N. Synthesis and plasmonic tuning of gold and gold–silver nanoparticles. Russ. Chem. Rev., **91**, RCR5058, DOI: <https://doi.org/10.57634/RCR5058>

At the IV Congress of Russian Analysts, a one-day symposium on nanoanalytics was organized, at which its chairman S.N. Shtykov presented the plenary lecture “Fundamental and applied aspects of Nanoanalytics”.

Activities planned for 2023-2024:

1. In accordance with the invitation of the Organizing Committee of the IV International Conference on Analytical Spectroscopy, on September 25-30, 2023, a plenary lecture "Nanospectroscopy and Nanoanalytics - Opportunities, Limitations and Prospects" will be presented

2. In accordance with the invitation of the Organizing Committee of the VI International Conference on Colloid Chemistry and Physicochemical Mechanics, October 23-26, dedicated to the 125th anniversary of the birth of P.A. Rebinder will present a plenary lecture "Engineering nanomaterials: regulation of chemical and physical properties, parameters for their characterization, reference materials and nanometrology".

3. Continued preparation of papers, reviews and manuals on the properties of nanomaterials, their modification and use in chemical analysis.

Report submitted by: Sergei Shtykov



Date submitted: 02.08.2023

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