EuCheMS-DAC Study Group / Task Force Annual Report for 2017-2018

Study Group / Task Force Name: **Nanoanalytics**

Study Group / Task Force Members and Affiliations:

Prof. Dr. Sergei Shtykov (Head), Saratov State University, Russia
Prof. Dr. Pavel Nesterenko, University of Tasmania, Australia
Prof. Dr. Nikolay Khlebtsov, Institute of Biochemistry and Physiology of Plants and Microorganisms, Russian Academy of Sciences, Russia
Prof. Joao Luis Machado Santos, University of Porto, Portugal
Prof. Raluca-Ioana Stefan-van Staden, National Institute of Research for Electrochemistry and Condensed Matter, Romania

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.

Activities and Outputs in 2017-2018 (e.g. reports, publications, seminars, meetings):

1. Book**: Nanoanalytics:** Nanoobjects and Nanotechnologies in Analytical Chemistry / Ed. by Sergei Shtykov. De Gruyter. Berlin, Germany, 2018. 446 p. https://www.degruyter.com/view/product/487908
Chapter 1. **Shtykov S.N.** Nanoanalytics: definitions, classification, history and primary advances. In: Nanoanalytics: P. 3-52. DOI (Chapter): https://doi.org/10.1515/9783110542011-001
Chapter 2. Dykman L.A., **Khlebtsov N.G.** and Shchyogolev S.Y. Gold Nanoparticles in Bioanalytical Techniques / In: Nanoanalytics: P. 55-86.
Chapter 5. Smirnova T.D., **Shtykov S.N.**, Zhelobitskaya E.A. Energy transfer in liquid and solid nanoobjects: Application in luminescent analysis / In: Nanoanalytics: P. 131-162.
2. Book: Lev Dykman, **Nikolai Khlebtsov**. Gold Nanoparticles in Biomedical Applications. CRC Press, Boca Raton and London, December 11, 2017. 332 p.
3. Pilot A.M., Ribeiro D.S.M., Rodrigues S.S.M., Santos C., **Santos J.L.M.**, Sales M.G.F. Plastic antibodies tailored on quantum dots for an optical detection of myoglobin down to the femtomolar range. *Scientific Reports*. 2018. V. 8. P. 1-11.
4. Bittar D.B., Ribeiro D.S.M., Pascoa R.N.M.J., Soares J.X., Rodrigues S.S.M., Castro R.C., Pezza L., Pezza, H.R., **Santos J.L.M.** Multiplexed analysis combining distinctly-sized CdTe-MPA quantum dots and chemometrics for multiple mutually interfering analyte determination. *Talanta*. 2017. V. 174 . P. 572-580.
5. Gupta V., Kazarian A.A., Gaskell B., Linford M.R., Jensen D.S., Paull B., **Nesterenko P.N.** Mixed-Mode Liquid Chromatography on Core Shell Stationary Phases Based on Layer-By-Layer Nanodiamond/Polyamine Architecture. *Current Chromatography.* 2018. V. *5*. P. 5-17.
6. Alves M.N., **Nesterenko P.N.,** Paull B., Haddad P.R., Macka M. Separation of superparamagnetic magnetite nanoparticles by capillary zone electrophoresis using non-complexing and complexing electrolyte anions and tetramethylammonium as dispersing additive. *Electrophoresis.* 2018. V. *39*, P. 1429–1436.
7. Coros M., Pogacean F., Magerusana L., Rosu M.C., Porava A.S., Socacia C., Bendea A., **Stefan-van Staden R.I.,** Pruneanu S. Graphene-porphyrin composite synthesis through graphite exfoliation: The electrochemical sensing of catechol. *Sens. Actuators B.* 2018. V. 256. P. 665-673.
8. Pogacean F., Coros M., Magerusan L., Rosu M., Socaci C., Gergely S., **Stefan van Staden R.I**., Moldovan M., Sarosi C., Pruneanu S. Sensitive detection of hydroquinone using exfoliated graphene-Au/glassy carbon modified electrode. *Nanotechnology.* 2018. V. 29. 095501 (9pp).
9. **Stefan-van Staden R.I.,** et. al. Pattern recognition of 8-hydroxy-2`-deoxyguanosine in biological fluids. *Anal. Bioanal. Chem.,* 2018. V. 410(1). P. 115-121. (graphene-modified electrode).

Conference: Third Congress on Analytical Chemistry (Russia) Shtykov S.N. Plenary lecture "The state and prospects of Nanoanalytics". Moscow, 9-13 Oct. 2017.

Activities planned for 2018-2019:

- Continuing efforts to promote Nanoanalytics concept in European Analytical Chemistry society.
- Continuing of joint work on preparation of the IUPAC project "Analytical chemistry of nanomaterials - critical evaluation" (# 2017-005-3-500.
- Preparing reviews devoted application of nanoobjects and nanotechnologies in Analytical Chemistry.
- The beginning of preparation of the chapter devoted to nanoanalytics in the textbook on Analytical chemistry.

Report submitted by: Sergei Shtykov

Date submitted: 16.07.2018