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## Analytical aspects and biomedical applications of selenium speciation

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Analytical challenges of selenium (Se) species determination, using hyphenated techniques, are discussed. Selenium (Se) is a complicated element for the inductively coupled plasma (ICP) based techniques, owing to relatively low sensitivity and abundant interferences. Since emission lines of Se are insensitive, nearly exclusive mass spectrometry (MS) detection is used for Se speciation in biological samples. Nevertheless, selenium detection by ICP-MS is considerably less sensitive compared to most elements. This is due to rather high ionisation potential of Se, its natural isotope distribution and spectral interferences, originating from argon of the ICP as well as sample bulk elements. Noteworthy, all Se isotopes are interfered to certain extent. A primary isotope <sup>80</sup>Se (abundance 49.61%) is totally interfered by argon dimer, whereas the less interfered <sup>77</sup>Se has abundance of 7.63% only. Severe interferences for Se require for the implementation of sector-field MS or using of collision or dynamic reaction cell technologies for Se quantification and speciation. The best performance, in respect of limits of detection, is obtained for collision or dynamic reaction cells with oxygen/hydrogen or methane as working gases. Additional analytical complications of Se speciation are related to separation and identification techniques, since biologically relevant Se-species diverse highly in their chemical nature: inorganic (selenite and selenate), organic, including seleno amino acids (selenocysteine, selenomethionine), low molecular weight species, specific selenoproteins (selenoprotein P, glutathione peroxidase, thioredoxin reductase etc.) and non-specific selenised proteins (e.g. selenised human serum albumin). The main biomedical applications of Se speciation are epidemiologic studies, selenium metabolomics and risk assessments studies.

### Biography

Nikolay Solovyev completed his PhD at Saint Petersburg State University. He is an Analytical Chemist, and a Lecturer in Analytical Chemistry at Institute of Chemistry, Saint Petersburg State University. He has expertise in "Clinical elemental analysis, speciation analysis and trace element metabolism".

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