Improved online-laser ablation of solids in liquids (LASIL) cell design: the stethoscope cell

Maximilian Podsednik[1], Maximilian Weiss[2], Silvia Larisegger[1], Michael Nelhiebel[1], Andreas Limbeck[2]

[1]KAI Kompetenzzentrum Automobil- und Industrieelektronik GmbH, Technologiepark Villach Europastraße 8, 9524 Villach, Austria
[2]TU Wien, Institute of Chemical Technologies and Analytics, Getreidemarkt 9/164-I2AC, 1060 Vienna,
email of main speaker: maximilian.podsednik@tuwien.ac.at

In online-LASIL, a solid sample is ablated under a continuous stream of a liquid carrier medium, which is then introduced into the plasma of an ICP-MS. This approach circumvents the laborious sample digestion step required for conventional ICP-MS analysis but enables liquid standards for quantification in contrast to other solid sampling techniques. [1, 2] For this reason, online-LASIL was mainly applied to analyze thin films deposited on standardized substrates; therefore, the cavity for the sample was optimized for 5x5x0.5 mm3 samples. However, due to the online-LASIL cell design, the analysis of bigger samples required a previous cutting or thinning step.
To overcome the limitations regarding the sample geometry, the online-LASIL cell was redesigned, resulting in the development of the stethoscope cell, allowing the analysis of flat samples with a minimum length of 7 mm. This work will present the new cell design compared to the previous one. It will be demonstrated how the new cell design offers more freedom in terms of sample geometry, while also remaining limitations will be discussed. The applicability of the stethoscope cell will be demonstrated on quantitative measurements of the SRM NIST 612.

[1] M. Weiss, C. Riedl, J. Frank, J. Fleig, A. Limbeck, Quantitative analysis of the platinum surface decoration on lanthanum strontium iron oxide thin films via online-LASIL-ICP-MS, Microchem J, 166 (2021).
[2] C. Herzig, J. Frank, A. Nenning, M. Gerstl, A. Bumberger, J. Fleig, A.K. Opitz, A. Limbeck, Combining electrochemical and quantitative elemental analysis to investigate the sulfur poisoning process of ceria thin film fuel electrodes, J Mater Chem A, 10 (2022) 1840-1851.