11th/12th February 2019
Technische Universität Wien
Vienna, AUSTRIA

International Workshop on

Current Trends in SOFC Research

Bridging the Gap Between Fundamentals and Application

courtesy of Udo Starzschke
Analysis of Complex Metal Oxide Thin Films by Online-LASIL with ICP-MS Detection

Christopher Herzig\textsuperscript{1,4}, Johannes Frank\textsuperscript{2}, Maximilian Morgenbesser\textsuperscript{1}, Alexander K. Opitz\textsuperscript{1,3}, Jürgen Fleig\textsuperscript{1}, and Andreas Limbeck\textsuperscript{1}

1 TU Wien, Institute of Chemical Technologies and Analytics, Vienna, Austria
2 TU Wien, Joint Workshop Technical Chemistry, Vienna, Austria
3 CD Laboratory for Interfaces in Metal Supported Electrochemical Energy Converters

Laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) is an established method for the analysis of solid samples. The possibility to obtain laterally resolved and depth information is of great interest for many research fields. Due to matrix effects in the ablation step as well as the ionization step, matrix matched standards are obligatory for quantification. For novel materials used in renewable energy sources (e.g., solid oxide fuel cells, solid state Li ion batteries), such matrix matched standards are not commercially available. Therefore in-house produced standards are necessary. Recently we presented a new method to overcome this drawback of the classical LA-ICP-MS technique. This approach is called online laser ablation of solids in liquids (online-LASIL) where the He carrier gas is replaced by a liquid (e.g., H\textsubscript{2}O) to transport the particles produced in the ablation step into the detection system. The big advantage of this technique is the possibility to use aqueous standard solutions for signal quantification, because the yielded nanoparticle suspensions can practically be treated like liquid solutions. With this procedure the advantages of the conventional liquid measurement and solid sampling approaches can be combined. Application of this technique for the stoichiometry analysis of STO thin films has been published recently by Bonta et al.\textsuperscript{[1]}

As a result of continuously improving the LASIL system, we are now able to use the advantages of ICP-MS as detection device (e.g., higher sensitivity, faster data acquisition). By using an improved cell design and more suitable flow injection components, easier sample handling and a faster washout could be achieved. These improvements allow laterally resolved analysis of larger sample areas. Complex metal oxide thin films (CMO) will be used to demonstrate the imaging capabilities of the online-LASIL technique.