Contribution ID : **127** Type : **Oral**

Neutron Imaging for Fuel Cells: Yesterday, Today and Tomorrow

Tuesday, 4 September 2018 16:10 (20)

Neutron imaging has been applied since nearly two decades to visualize the water distribution in operating fuel cells, and has largely contributed to unravel the mysteries of water management in these devices. Two key characteristics make neutron imaging particularly attractive for fuel cell research: the high penetration of neutrons through dense structural materials such as aluminum and steel, and the strong contrast provided by liquid water. This combination makes neutron imaging fully non-invasive, in the sense that little adaptations have to be done on fuel cells, if any.
Here, a brief overview of the contributions brought in the past by neutron imaging to the field of fuel cell research (at PSI and worldwide) will be given first. Following this, the application of neutron imaging to our latest research, focusing on our developments in novel porous materials [1] and in innovative fuel cell designs based on evaporative cooling [2,3] will be presented. Finally, I will give an outlook focused on how advanced neutron imaging techniques such as neutron grating interferometry (nGI) and time-of-flight (TOF) imaging can solve problems beyond the reach of conventional imaging.

[1] A. Forner-Cuenca, J. Biesdorf, L. Gubler, P.M. Kristiansen, T.J. Schmidt, P. Boillat, "Engineered Water Highways in Fuel Cells: Radiation Grafting of Gas Diffusion Layers", *Advanced Materials* **27**, 6317 (2015)
[2] P. Boillat, E.H. Lehmann, P. Trtik, M. Cochet, "Neutron imaging of fuel cells – Recent trends and future prospects", *Current Opinion in Electrochemistry* **5**, 3 (2017)
[3] M. Cochet, A. Forner-Cuenca, V. Manzi, M. Siegwart, D. Scheuble and P. Boillat, "Novel Concept for Evaporative Cooling of Fuel Cells: an Experimental Study Based on Neutron Imaging", *Fuel Cells*, Accepted for Publication, In Press

Primary author(s) : Dr BOILLAT, Pierre (Paul Scherrer Institut (PSI), Electrochemistry Laboratory (LEC) and Laboratory for Neutron Scattering and Imaging (LNS))

Co-author(s) : Dr COCHET, Magali (Paul Scherrer Institut (PSI), Electrochemistry Laboratory (LEC)); Mr SCHEUBLE, Dirk (Paul Scherrer Institut (PSI), Electrochemistry Laboratory (LEC)); Ms MANZI-OREZZOLI, Victoria (Paul Scherrer Institut (PSI), Electrochemistry Laboratory (LEC)); Ms SIEGWART, Muriel (Paul Scherrer Institut (PSI), Electrochemistry Laboratory (LEC) and Laboratory for Neutron Scattering and Imaging (LNS))

Presenter(s) : Dr BOILLAT, Pierre (Paul Scherrer Institut (PSI), Electrochemistry Laboratory (LEC) and Laboratory for Neutron Scattering and Imaging (LNS))

Session Classification : Speaker Sessions and Seminars

Track Classification : Engineering