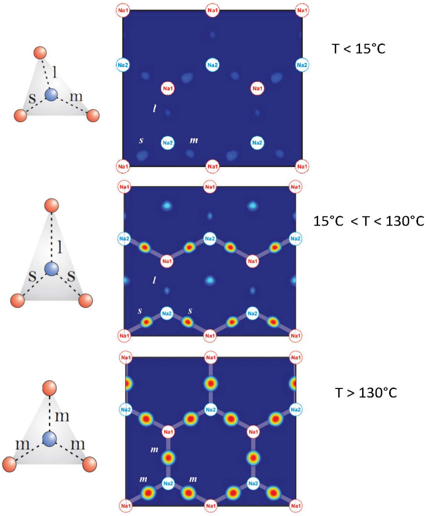

Figure 1. Na diffusion paths at different temperatures in one of the Na layers of $Na_{0.7}CoO_2$ with partially occupied Na1 (red) and Na2 (blue) sites [3].

Keywords: Na batteries, Na diffusion, neutron powder diffraction

MS19-P11 Advanced fuel cell component characterization by the development of *in-situ* SAXS flow cell

Olha Sereda[1]

1. Centre Swiss of Electronics and Microtechnology

email: osr@csem.ch

The most commonly used technique for structural characterization at the nanoscale is transmission electron microscopy (TEM). However, there are several limitations to this technique: the information is only obtained on a very small part of the sample and the contrast between support and supported catalyst nanoparticles can be very weak for certain systems like Pt nanoparticles on a high-Z metal oxide support. This can make it difficult to distinguish the catalyst nanoparticles from individual support crystallites. Moreover, due to the very short electron absorption length in condensed matter, TEM investigations cannot be performed *in situ* during operation. These limitations of TEM can be overcome by small-angle X-ray scattering (SAXS): even for very small beam diameters of a couple of hundred micrometers, the scattering curve contains information of hundreds of millions of catalyst nanoparticles [1]. The support contribution to the scattering curve can be subtracted: in case of anomalous SAXS (ASAXS), several energies are used close to the Pt LIII absorption edge in an energy-tunable synchrotron radiation, while in laboratory SAXS diffractometer, incident X-Ray energy is fixed and measurements of both support and catalyst on support are required. The results of *in-situ* ASAXS experiments on $Pt/IrTiO_2$ will be presented. The conventional model of spherical catalyst particles to incorporate the particle-support interference effect will be explained. Moreover, an experimental setup to perform *in-situ* SAXS experiments in a laboratory machine will be shown on Pt / Vulcan carbon system. [1] Binninger T., Garganourakis M., Han J., Patru A., Fabbri E., Sereda O., Kötz R., Menzel A., Schmidt T.J. *Phys. Rev. Applied*, 2015, 3, 024012

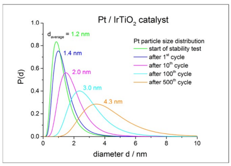

Figure 1. Evolution of the NPs size distribution

Keywords: small-angle X-ray scattering (SAXS), nanoscale characterisation