Time resolved *in situ* studies of the oxygen intercalation into $SrCoO_{2.5}$ performed by neutron diffraction and X-ray absorption spectroscopy

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Solid state reactions at ambient temperature play a key role for many technological applications e.g. batteries, membranes in fuel cells or sensors. Our understanding concerning solid state reaction mechanisms is still today quite poor. This naturally limits any optimisation and also the developing and tailoring of new compounds. In this context the development of oxygen ion conductors working already at room temperatures is of actual interest. For a more general understanding of the diffusion mechanisms, reaction pathways and related activation energies, we have investigated the electrochemical oxygen intercalation into some non-stoichiometric oxides, in particular $Sr(Fe,Co)O_{2.5+x}$ by in situ by neutron diffraction and X-ray absorption spectroscopy. Electrochemical oxidation allows to control exactly the oxygen stoichiometry and any structural evolution as a function of the charge transfer.

Beside structural ordering phenomena, observed with neutron diffraction, we observed here for the first time the formation of O^- species by X-ray absorption spectroscopy. This is an important fact especially for a more fundamental understanding of oxygen ion mobility in solids at low temperatures.

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