IN-SITU CHARACTERISATION OF NOVEL FUEL CELL MATERIALS

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As alternative energy technologies such as solid oxide fuel cells near commercialisation, there is a requirement to develop next generation materials to enhance performance, both in terms of electrochemical performance and component durability. A vital part of this development is understanding the phase evolution of these novel materials as a function of temperature and atmosphere, as each component is exposed to demanding environments during processing and operation.

Recently materials with complex crystal structures and/or oxygen interstitial content have been proposed as potential fuel cell materials [1]. Of these, we have been involved with the *in-situ* characterisation of several solid solution series under variable atmospheres, using both laboratory X-ray diffraction and neutron diffraction techniques. The materials of interest in this work are from the $Ln_2Ni_{1-x}Co_xO_{4+\delta}$ and $Ce_{1-x}La_xNb_{1-y}V_yO_{4+\delta}$ solid solution series, both of which contain oxygen excess materials, and $La_2Mo_2O_9$ a novel fast oxide ion conductor.

In this presentation the structural evolution of these materials will be discussed as will the complimentarity of both X-ray and neutron diffraction techniques, as well as some of the challenges in defining the suitability of materials for fuel cell applications.

[1] A.Lashtabeg and S.J. Skinner, J. Mater. Chem., 2006 **16** 3161