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Synthesis and characterization of the surface structure of thin film oxides for use as mixed conductors in electrochemical cells

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Abstract

The need for high performance mixed conductors in a variety of electrochemical devices is well documented: from electrolysis to fuel cells, batteries, & permeation membranes. Many of these devices are also reliant on the exchange of species from the gas phase to the solid phase through an oxygen reduction reaction. However the understanding of these processes at the outermost surface is not well understood. Current models suggest that in many oxides it is the presence of transition metal species on the surface that facilitates the oxygen reduction reaction. Recently, with the advent of new surface sensitive techniques such as Low Energy Ion Scattering, we have been able to demonstrate that in perovskite and related materials the transition metal is not the terminating species on the surface, which has implications for development of models of oxygen reduction. In this work we have used model thin film systems to demonstrate these features.

Biography

Stephen Skinner is a Reader in Materials Chemistry in the Department of Materials at Imperial College London with research interests in new materials for energy generation/storage technologies. He is primarily interested in the development of materials for solid oxide fuel cells and in understanding their transport properties, utilizing a combination of diffraction and spectroscopic techniques. In-situ structural and electrical characterization of oxides and the determination of the oxygen transport kinetics are key areas of interest. He has published over 90 papers in this area and is currently associate editor of the Journal of Materials Chemistry A.