Synthesis and Structure of Layered Perovskite-Zirconia Thin Film Interfaces: Model Systems for Fuel Cell Studies (PRF #51436-DNI10)

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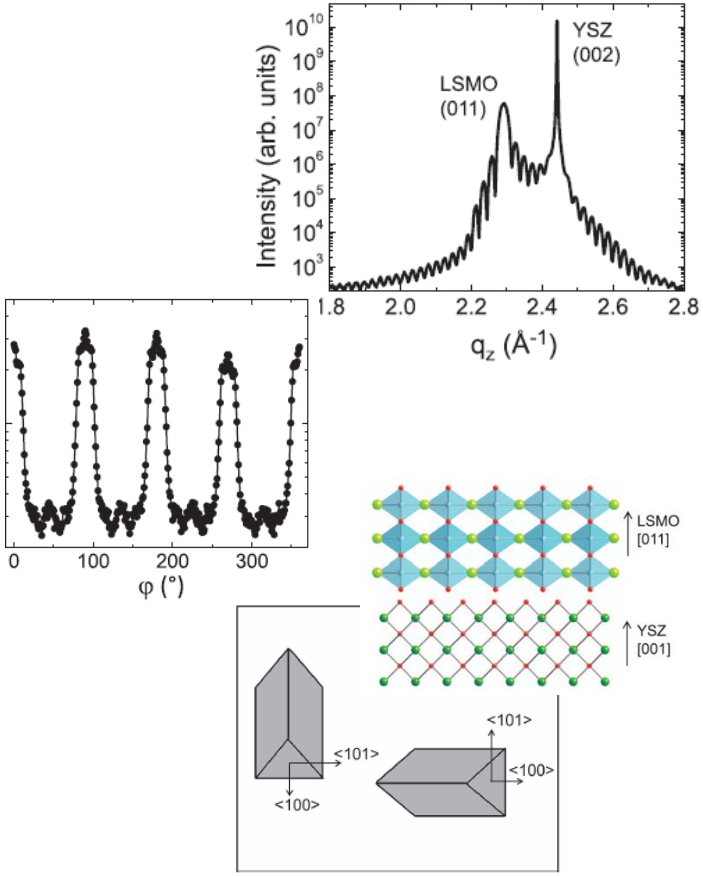
Goal: This project focuses on the synthesis of abrupt cathode/electrolyte interfaces, which will act as model systems in the study of interfacial reactions in solid oxide fuel cells (SOFCs). We use oxide molecular beam epitaxy to deposit perovskite films on single crystal yttria-stabilized zirconia substrates. By studying these idealized systems, this project aims to provide insight into how the performance and interfacial stability of SOFCs can be improved.



Results:

- High quality films of $La_{1-x}Sr_xMnO_3$ and $La_{1-x}Sr_xFeO_3$ have been deposited on YSZ substrates.
- Using synchrotron diffraction and transmission electron microscopy, the atomic structure of the perovskite/zirconia interface has been characterized in depth.
- A columnar microstructure is observed with a uniform crystallographic orientation along the out-of-plane direction and preferred in-plane orientations.

C. R. Smith *et al.*, Journal of the Electrochemical Society **159**, F436 (2012)