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Degradation Mechanisms in Oxygen Ion Conducting Materials<sup>1</sup> ALEXANDRE LUSSIER, MARTIN FINSTERBUSCH, YVES U. IDZERDA, Montana State University - Physics, IDZERDA GROUP TEAM — We have developed a testing apparatus to characterize degradation mechanisms in oxygen ion conducting materials, with an emphasis on Solid Oxide Fuel Cell (SOFC) materials. While chemical potentials drive currents in SOFCs, we utilize a simple electrical potential to drive oxygen ionic currents through materials and interfaces. We can additionally adjust the temperature and gaseous environment of our experiment, enabling us to identify and characterize degradation mechanisms and their causes. Early performance results confirm multiple SOFC cathode degradation mechanisms driven by both high temperatures and ion currents. In particular, cation inter-diffusion is prevalent at interfaces such as those between La(0.6)Sr(0.4)Co(0.2)Fe(0.8)O(3) and Ga-doped CeO(2) resulting in an interfacial structure which is increasingly resistant to subsequent oxygen ion flow. By isolating and understanding various degradation mechanisms we can more effectively address those mechanisms to improve long term ion conducting material performance.

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