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In Situ Investigations of Ion Transport at Oxide Surfaces[1] DAVID SIEGEL, KEVIN MCCARTY, FARID EL GABALY, Sandia National Laboratories
— Ion transport through materials driven by electric potential is essential to many processes, including electrical energy storage. Here we study in situ the behavior of oxide surfaces in the presence of applied electric fields with low-energy electron microscopy (LEEM), angle-resolved photoemission spectroscopy (ARPES), and related structural and spectroscopic measurement techniques. We measure with high spatial resolution the electric potential on the surface of yttria-stabilized zirconia (YSZ), a prototypical oxygen ion conductor, as a function of distance from a metallic electrode. The dependence of the potential distribution on temperature and oxygen gas pressure is determined. Finally we explore which types of surface sites facilitate the gas-surface reactions that create and annihilate the oxygen ions.

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David Siegel
Sandia National Laboratories

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