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Modified Cr valence in symmetric oxygen ion conducting half cells with ion flow MARTIN FINSTERBUSCH, ALEXANDRE LUSSIER, EZANA NEGUSSE, YVES IDZERDA, Montana State University Physics Department, 264 EPS, Bozeman Mt 59717 — The degradation mechanisms in ion conducting materials, including solid oxide fuel cells (SOFC), are still of high interest in current energy research, especially with regards to material and interface stability, fuel impurities and impurities originating from sealing or interconnect materials. A common practice is the use of symmetric half-cells (e.g. cathode/electrolyte/cathode) to determine interface stability via cross section Energy Dispersive x-ray Spectroscopy line scans and overpotential magnitude and degradation via AC-impedance spectroscopy. Using these electrically driven half-cells, we have developed a new method to directly measure degradation due to oxygen ion flow through ion conducting materials and their associated interface structures. By using X-ray absorption spectroscopy of cells before and after oxygen ion flow (800 $^\circ$C for 100 hours), we determined that the valence state of Cr that migrated from a metallic interconnect into the porous cathode changes in valence from +3 (Cr_2O_3) to +6 (CrO_3), depending on the direction of the oxygen ion flow. This observation is strong evidence of the influence of the oxygen ion flux on the degradation mechanisms of ion conducting materials.

Martin Finsterbusch
MSU Physics Department, 264 EPS, Bozeman Mt 59717

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