In-situ Structure and Transport Correlations in Magnetic Tunnel Junctions \(^1\) ANN CHIARAMONTI, AMANDA PETFORD-LONG, BERND KABIUS, JON HILLER, Argonne National Laboratory, Materials Science Division, WILLIAM EGELHOFF, NIST, MARK SCHEEFF, Hummingbird Scientific — The final transport properties of magnetic tunnel junctions are dictated by their underlying magnetic domain and microstructure. As such, atomic-level characterizations combined with local, site-specific transport measurements are essential to truly understand their fundamental behavior. In this poster, we present local, nanoscale, site-specific transport measurements of magnetic tunnel junctions with MgO and Al\(_2\)O\(_3\) tunnel barriers and FeCo-based ferromagnetic layers made using a novel \textit{in-situ} TEM nanobiasing holder. When combined with the simultaneous nanoscale microstructure and interfacial characterization available in the TEM, tunneling measurements from a fully described nanoscale region of the specimen can be obtained. The resulting I-V curves can be fit to the Simmons model [J.G. Simmons, J. App. Phys. \textbf{34}, 6 (1963)], allowing structure-transport relationships to be directly studied for a variety of tunnel junction materials and compositions.

\(^1\)This work is supported by the U.S. Department of Energy under contract No. DE-AC02-06CH11357.