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Metal-Dielectric Sidewall Scattering Measurements with Ballistic Electron Emission Microscopy CHRIS DURCAN, ROBERT BALSANO, VINCENT LABELLA, SUNY College of Nanoscale Science and Engineering — As the spatial dimensions of metal lines shrink below 50 nm their resistance increases due to increased electron scattering from sidewalls and grain boundaries. Conventional methods of determining metal line resistance use current voltage measurements which averaged over the entire volume and need phenomenological modeling to extract the sidewall scattering parameter. Ballistic electron emission microscopy (BEEM) is a scanning tunneling microscopy (STM) technique that can measure electron transport through materials and interfaces with nanometer spatial resolution. This work will describe our progress on performing BEEM measurements on lithographically patterned 40-nm-wide trenches in a dielectric film on a semiconductor that are filled with a metal. Electron beam lithography is utilized to pattern the structure and both BEEM imaging and spectroscopy is performed in an attempt to locally measure scattering due to sidewalls. The ultimate goal is to map electron transport throughout a metal line/sidewall structure to provide nanoscale insight into the sources of electron scattering.

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