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Hot Electron Scattering in Thin Metal Films Utilizing Ballistic Electron Emission Microscopy CHRISTOPHER DURCAN, WESTLY NOLTING, ROBERT BALSANO, State Univ of NY - Albany, VINCENT LABELLA, SUNY Polytechnic Institute — Electron scattering in nm-thick metal films has fundamental and technological importance. Ballistic Electron Emission Microscopy (BEEM) an STM based technique can be utilized to measure the scattering rate and understand the scattering mechanisms. By injecting electrons from the STM tip in the energy range of 0.2 eV- 1.5 eV into the metal base of a metal semiconductor diode and measuring the amount of current collected in the semiconductor a Schottky barrier height can be measured. In addition, by measuring the decay in the collector or BEEM current vs. metal film thickness, an electron attenuation length can be measured. One question has always been; what are these BEEM attenuation lengths sensitive to? Intrinsic properties of the metal, or extrinsic effects such as the structure of the film? By measuring the attenuation length of W and Cr and comparing to prior measurements of Cu, Ag, Au a comparison between the BEEM attenuation length and resistivity can be achieved over an order of magnitude in resistivity. The results show an inverse relationship that one expects for mean free path and resistivity, indicating that BEEM measurements are sensitive to the intrinsic properties of the metal and not solely the structure of the films.

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