Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Temperature dependence of lateral hot-electron spreading in Au films using Cross-Sectional Ballistic Electron Emission Microscopy C. MARGINEAN, J.P. PELZ, The Ohio State University — Cross-sectional ballistic electron emission microscopy (XBEEM) was used to investigate the *temperature dependence* of hot-electron lateral spreading in metal films. A sequence of GaAs QWs of 1 to 15 nm width (separated by 200nm $Al_{0.3}Ga_{0.7}As$ barrier layers) were cleaved *ex situ,* and then 10 nm-thick of Au was thermally deposited on the cleaved edge to form Au Schottky barrier (SB) "nanoaperture" contacts [1]. Previous XBEEM results showed an unexpectedly large hot-electron lateral spreading at room temperature consistent with multiple electron scattering inside the metal film [2]. If phonon scattering of hot-electrons is significant in Au films (as previously suggested [3]), then the lateral spreading should increase at lower temperature. However, we found that the lateral spreading at 80K was almost the same as at room temperature, suggesting that electron-phonon scattering is not the dominant scattering mechanism. We will also discuss the temperature dependence of the BEEM current *amplitude*, as well as Monte-Carlo simulations of the lateral spreading process. Work supported by NSF Grant No. DMR-0505165. [1] C. Tivarus *et al.*, PRL **94**, 206803 (2005) [2] C. Tivarus *et al.*, APL **87**, 182105 (2005) [3] L. D. Bell, PRL **77**, 319007 (1996)

W. Cai
The Ohio State University

Date submitted: 21 Nov 2008 Electronic form version 1.4