

Abstract Submitted  
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**Electromigration force, surface resistivity and low-frequency noise**<sup>1</sup> ELLEN D. WILLIAMS, O. BONDARCHUK, C.G. TAO, W. YAN, W.G. CULLEN, Department of Physics & MRSEC, University of Maryland, College Park, P.J. ROUS, T. BOLE, Department of Physics, University of Maryland Baltimore County — Scattering of charge carriers from surface structures will become an increasing factor in the resistivity as the structure decreases in size to the nanoscale. The measured effects of scattering at the most basic surface defect, a kink in a step edge, are 5x larger than for a freely diffusing surface atom. For thermally active materials, this yields a corresponding contribution of the fluctuating steps to the surface resistivity, which will exceed 1% of the bulk resistivity as wire diameters decrease below 10s of nanometers. The temporal fluctuations of kink density will cause resistivity noise. Relating the known fluctuation spectrum of the step displacements to fluctuations in their lengths, the corresponding resistivity noise is predicted to show spectral signatures of  $\sim f^{-1/2}$  for step fluctuations governed by random attachment/ detachment, and  $\sim f^{-3/4}$  for step fluctuations governed by step-edge diffusion.

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