Strong magnetic scattering from TiO$_{x}$ adhesion layers$^{1}$ D. NATelson, A. TRIONFI$^{2}$, S. LEE, Department of Physics and Astronomy, Rice University — Electronic phase coherence in normal metals is incredibly sensitive to magnetic scattering. As a result, the weak localization magnetoresistance and time-dependent universal conductance fluctuations are powerful probes of magnetic impurities. We report measurements of these effects in Au and Ag nanowires, comparing samples with and without an underlying 1.5 nm thick Ti adhesion layer. Because of background oxygen, this layer is likely TiO$_{x}$, with $x < 2$. Samples with no adhesion layer show no sign of magnetic contamination. Samples with adhesion layers measured immediately after fabrication show clear evidence of strong magnetic scattering. Annealing in air reduces the concentration of scatterers, as does evaporation under conditions that encourage the formation of TiO$_{2}$. This strongly suggests that the magnetic scattering and its evolution are related to the oxidation state of the Ti, and is consistent with recent reports of ferromagnetism in oxygen-poor TiO$_{2-\delta}$.

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$^{2}$now at Sandia National Laboratory

Douglas Natelson
Department of Physics and Astronomy, Rice University

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