

Abstract Submitted
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Energy Spectra of Individual Gold Monolayer Protected Clusters Measured by Single Electron Tunneling Force Microscopy NING ZHENG, JON JOHNSON, GANGLI WANG, CLAYTON WILLIAMS, University of Utah — Monolayer Protected Clusters (MPCs) exhibit strong quantum confinement effects and size dependent electronic, optical and chemical properties. The energy levels of individual gold MPCs (Au_{38} & Au_{140}) have been directly measured by Single Electron Tunneling Force Microscopy at room temperature in UHV.^[1,2] Single electrons, tunneling between a probe tip and individual gold MPCs are detected using a novel surface potential measurement technique.^[2] Tunneling events to and from the MPCs are recorded as a function of the applied bias voltage. A clear electronic spectrum is obtained, showing a HOMO-LUMO gap for Au_{38} but not for Au_{140} . For both MPCs the single electron charging energy is measured. Spectral differences from particle to particle are observed. The energy spectra obtained by this method are directly compared with existing electrochemical data,^[3] showing good agreement. The methodology will be described and the measured electronic spectra for Au_{38} and Au_{140} will be presented and discussed. 1. E. Bussmann, D. J. Kim, and C.C. Williams, *Appl. Phys. Lett.* **85**, 2538 (2004) 2. E. Bussmann, N. Zheng, and C. C. Williams, *Nano Lett.*; **2006**; *6*(11) 3. Lee, D el at, *J. Am. Chem. Soc.* **2004**, *126*, 6193

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