Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Temperature-dependent molecular conduction measured by the electrochemical deposition of a platinum electrode in a lateral configuration Y.W. PARK, B. KIM, S.J. AHN, J.G. PARK, S.H. LEE, School of Physics and NSI-NCRC, Seoul National U, Seoul, Korea, ELEANOR E.B. CAMPBELL, Department of Experimental Physics, Gothenburg U and Chalmers U of Technology, Gothenburg, Sweden — Temperature-dependent current–voltage (I–V) characteristics of a molecule, 1,4-benzenedimethanethiol, was measured for 30 K$< T <$300 K by a method of contact made by the electrochemical deposition of a platinum electrode in a lateral configuration. The I–V characteristics are nonlinear and asymmetric in the entire temperature range and the current decreases with decreasing temperature down to 40 K. Below 40 K, the I–V characteristics become temperature independent. The asymmetric I–V characteristics can be understood as arising from a better contact on one side (made by the self-assembled monolayer) than on the other side (made by the electrochemically deposited Pt electrode). The activation energy of thermally activated conduction for $T >$100 K is typically 0.11 eV. For $T <$40 K, the observed temperature independent I–V characteristics are fitted to the Fowler–Nordheim tunneling expression with barrier height of 1–2 eV depending on the contact strength of samples.

Y.W. Park
School of Physics and NSI-NCRC, Seoul National University
Seoul 151-747, Korea

Date submitted: 08 Dec 2004 Electronic form version 1.4