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Inelastic scattering effects on single molecule spectroscopy: Consequences for Negative Differential Resistance JASON PITTERS, National Institute for Nanotechnology - NRC, ROBERT WOLKOW, University of Alberta — The adsorption of styrene and cyclopentene on Si(100) has been studied with scanning tunneling microscopy and spectroscopy. Blinking of molecules in images and irregularities in current-voltage spectra and in current-time traces are analyzed. It is also shown that NDR-like features in IV spectra of both styrene and cyclopentene molecules are not consistently present. Such erratic behavior cannot be accounted for by voltage controlled resonant alignment of adsorbate and substrate energy levels but is consistent with random configuration change driven by inelastically scattered electrons. These random processes, which include molecular rearrangement, desorption and/or decomposition occur with increasing frequency at larger voltage and current settings. It is concluded that the molecules studied do not exhibit negative differential resistance due to a resonant tunneling mechanism. Conditions where resonant NDR may be observed are discussed.

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