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Single Molecule Manipulation and Spectroscopy of Chlorophyll-a from Spinach JESSICA-JONES BENSON, VIOLETA IANCU, SAW-WAI HLA, Quantitative Biology Institute, Physics & Astronomy Dept., Ohio University, Athens, OH 45701 — Chlorophyll-a, a molecule produced from ‘Spinach’, adsorbed on a Au(111) surface has been investigated by using an ultra-high-vacuum low-temperature scanning-tunneling-microscope (UHV-LT-STM) at liquid helium temperatures. Studies are carried out both on isolated single molecules and on self-assembled molecular layers. The tunneling I-V and dI-dV spectroscopy of chlorophyll-a elucidate electronic properties of single molecule, such as the HOMO-LUMO gap and molecular orbital states. Mechanical stability of the chlorophyll-a is examined by using STM lateral manipulation (1,2). Here, the STM tip is placed just a few angstrom separation from the molecule to increase the tip-molecule interaction. Then the tip is laterally scanned across the surface resulting in pulling of the molecule. The detailed molecule movement is directly monitored through the corresponding STM-tip height signals. Our results reveal that the spinach molecule is a promising candidate for environmental friendly nano-device applications. (1). S.-W. Hla, K.-H. Rieder, *Ann. Rev. Phys. Chem.* **54** (2003) 307-330. (2). S.-W. Hla, et al. *Phys. Rev. Lett.* **93** (2004), 208302. This work is financially supported by the US-DOE grant DE-FG02-02ER46012.

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