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Scanning Tunneling Microscope Manipulation of β-Carotene on Au(111) at 4.6 K TIMUR SKEINI, VIOLETA IANCU, SAW-WAI HLA, Ohio University — The properties of isolated and clustered β-carotene molecules adsorbed on a Au(111) surface were investigated using a low temperature scanning tunneling microscope (STM) at 4.6 K in an ultra-high-vacuum condition. A sub-monolayer coverage of all trans- β-carotene molecules were deposited on Au(111) via thermal evaporation using a custom-built Knudson cell. On Au(111), the β-carotene molecules can be found as a form of a cluster, as well as, isolated single molecules. Furthermore, the β-carotene molecules can have both trans and cis conformations on this surface. In order to probe the mechanical stability of the molecules and molecular clusters, we employ STM manipulation procedures. Lateral manipulations of the molecules across the surface with the STM-tip reveal that the molecules are rather stable. Furthermore, the STM manipulation experiments on β-carotene clusters often result in lateral displacement of the entire cluster indicating strong interactions between the neighboring molecules within the cluster, but a weak molecule-surface interaction. Moreover, by injecting the tunneling electrons into the molecules, the rotation of a cis β-carotene has been able to induce in a controlled manner on the surface. This work is supported by the US Department of Energy, Basic Energy Sciences grant number DE-FG02-02ER46012.

Timur Skeini
Ohio University

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