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Unidirectional Linear Diffusion on an Isotropic Cu(111) Surface in a Periodic and Asymmetric Potential DEZHENG SUN, Department of Physics, UC, Riverside, KI-YOUNG KWON, KIN L. WONG, GREG PAWIN, ERIC CHU, ZHIHAI CHENG, DAE-HO KIM, MIAOMIAO LUO, Department of Chemistry, UC, Riverside, SAMPYO HONG, TALAT S. RAHMAN, Department of Physics, University of Central Florida, Orlando, MICHAEL MARSELLA, LUDWIG BARTELS, Department of Chemistry, UC, Riverside — We performed an STM study of the diffusion of 1,4-benzenedithiol, 9-thioanthracene, 9,10-dithioanthracene (DTA) and 2,3-dimethyl-9,10-dithioacethylanthracene (DMDTA) as well as napthaquinone, anthraquinone and pentacenetetrone on Cu(111). Inherently uniaxial motion of all species with two thiol groups and at least three aromatic rings are observed. Sequential placement of the substrate linkers prevents DTA and DMDTA from rotating or veering off course. Asymmetric methylation impacts DTA's diffusive behavior by about 100-fold decrease in surface mobility caused by a about 2-fold increase of the diffusion barrier, with the overall symmetry of DTA diffusion not affected: A forward/backward ratio of 1.009 ± 0.01, were found i.e. less than 1% deviation from unity. This is in stark contrast to the classical behavior but in perfect agreement with Tolman's "Principle of Microscopic Reversibility?. Density functional theory (DFT) calculations are performed and results are discussed

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