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Fundamental Issues of Single Molecule Manipulation: Driving Nanotrucks ANDREW OSGOOD, YASUHIRO SHIRAI, YUMING ZAO, J. M. TOUR, K. F. KELLY, Rice University — The current trend in the physical and biological sciences is the continued miniaturization of machinery from the macroscopic to the microscopic world. The ultimate goal is to build machines at the nanoscopic level from individual molecules. However, this bottom-up approach presents a critical question of how to control the molecular-sized machines. We have synthesized the molecular nanoscale vehicle NanoTruck, and seek to control the NanoTruck using a STM. The NanoTruck is similar to a macroscopic truck by integrating three essential components, a planar “chassis,” four rotating “axles,” and four round “wheels.” Our work has consisted of characterizing and manipulating these molecules and other similar derivatives with STM in both UHV and ambient conditions at room temperature and above. Results from these experiments are discussed.

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