

Abstract Submitted  
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**Dynamic Molecular Nanostructures Assembled with Atomic Manipulation**<sup>1</sup> BRIAN K. FOSTER<sup>2</sup>, HARI C. MANOHARAN<sup>3</sup>, Stanford University, Stanford, CA 94305 — Molecular nanostructures of CO were engineered on a Cu(111) surface by single molecule manipulation in a custom-built low-temperature scanning tunneling microscope (STM). The structures were designed to allow for well-defined motion of either a single molecule or linked sets of molecules on the surface, for the purpose of studying the system's dynamic translational behavior. Dynamics such as meta-stability, bi-stability and molecular vibration were observed; STM measurements were used to decipher dynamic behavior through coupling to electronic charge via elastic and inelastic tunneling. We also explore the coupling of vibrational modes of individual molecules (at THz frequencies) to the molecular translation rates (at kHz frequencies or below). The dynamic behavior of such structures offers the potential to control and transmit information across surfaces.

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