Abstract Submitted
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Single molecule motor with dipolar arms YUAN ZHANG, HEATH KERSELL, NQPI, and Department of Physics & Astronomy, Ohio University, Athens, OH, R. STEFAK, CEMES, CNRS, Toulouse, France, YANG LI, U.G.E. PERERA, Nanoscale and Quantum Phenomena Institute, and Department of Physics & Astronomy, Ohio University, Athens, OH, G. RAPENNE, CEMES, CNRS, Toulouse, France, S.-W. HLA[1], Nanoscale and Quantum Phenomena Institute, and Department of Physics & Astronomy, Ohio University, Athens, OH 45701 — One of the goals of nanotechnology is to have billions of nano-molecular machines packed in a tiny area that can operate under control. Simultaneous operation of such nano-machines requires developing a system in which the nanomachines can communicate each other. Here we investigate a double-decker class molecular motor adsorbed on Au(111) and Cu(111) surfaces using low temperature scanning tunneling microscopy in an ultrahigh vacuum environment. Our molecular motor is formed by a porphyrin based stator, and a dipole active rotor. An Eu atom is used to link the rotation and stationary parts of the motor, and therefore it acts as a single atom ball bearing. On Cu(111) surface, however, the molecules form self-assembled structures with a hexagonal pattern. The stable positions are maintained by balancing two interactions; the internal interactions between the upper and lower decks, and the dipolar interactions with the neighboring rotors. On Au(111) surface, however, we observe thermal induced rotations of the individual molecular motors at 80K. This work is a step forward in the development of molecular machines for nanoscale information transport.

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