Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Tracking Nanocars Using Single Molecule Spectroscopy STEPHAN LINK, SAUMYAKANTI KHATUA, KEVIN CLAYTOR, JASON GUERRERO, JAMES TOUR, Rice University — Nanocars belong to an exciting new class of molecules known as molecular machines. They consist of four fullerene or carborane wheels attached to a chassis consisting of a stiff aromatic backbone. The nanocars are designed to roll over a solid surface making them potential candidates for nano-cargo transporters. Here, we present our results on tracking of nanocars by single molecule fluorescence spectroscopy. By attaching the fluorescent tag tetramethylrhodamin isothiocyanate to the nanocars, we were able to visualize and track individual nanocars using confocal sample scanning microscopy. Fluorescence images were analyzed for directional movement as opposed to random diffusion or stage drift. We had to overcome 2 major problems in our image analysis: 1) fluorescence photo-blinking and 2) photo-bleaching. We developed routines that are capable of tracking individual fluorescent molecules while accounting for photo-blinking and photo-bleaching. The ability to track individual nanocars is checked independently by simulations. Our method is not limited to tracking of nanocars however, and can be extended to follow individual molecules in biological or mechanical systems as well.

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Date submitted: 03 Dec 2007 Electronic form version 1.4