

Abstract Submitted  
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**The Smoluchowski Effect and Step-Edge Behavior of Nanocars and Azofullerenes** ANDREW OSGOOD, YASUHIRO SHIRAI, TAKASHI SASAKI, J.M. TOUR, K.F. KELLY, ELECTRICAL AND COMPUTER ENGINEERING DEPARTMENT, RICE UNIVERSITY COLLABORATION, CHEMISTRY DEPARTMENT, RICE UNIVERSITY COLLABORATION — The nanocar molecule - four fullerene wheels connected by rotating alkyne axles to a central chassis - was the first molecule designed and fabricated specifically for nanoscale manipulation. We have investigated the imaging and manipulation of the nanocar molecule on Au(111) by variable-temperature STM, with specific focus on their unique dynamic step-crossing and -straddling abilities. Our static analysis of the molecules adsorbed at step edges under the influence of the Smoluchowski effect has begun to explain the complex interactions of their behavior in these regions, with an eye towards surface manipulation in three dimensions. Further manipulation studies also attempt to elucidate the fullerene-substrate interactions that make rolling manipulation possible, with special attention paid to the azofullerene dimer - one of the first specifically designed and tested molecules incorporating two simple mechanical functions – actuation of the “azo” unit and rolling / rotation of the wheel-like fullerenes.

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