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**Photon-induced Molecular Motion Probed by STM** JUN ZHANG, KEVIN KELLY, Rice University, TAKASHI SASAKI COLLABORATION, JAMES TOUR COLLABORATION — To understand the mechanics of nanoscale motion and manipulation in true molecular machines, we have investigated fullerenes and fullerene-based derivatives with an eye towards the molecular rolling motion on surfaces. Assisted by scanning tunneling microscopy (STM), we have successfully observed the conformational changes through the chemomechincal interaction with the external photonic and tunneling electron excitations. In particular, we investigated a fullerene dimer structure which included an azo-based linkage. This system demonstrated a mechanical switching by incident irradiation, due to the azo transformation between the “cis” and “trans” states. This is particularly exciting because the hinge-like lateral motion is coupled to the surface through the axle and the rolling motion of the fullerene wheel. The results of these studies underscore the ability to control designed motion in molecular-sized nanostructures through specific macroscopic excitations.

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