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Observation of Orbital Gate Modulation in Molecular Junctions
HYUNWOOK SONG, YUN HEE JANG, TAKHEE LEE, Gwangju Institute of Science and Technology, YOUNGSANG KIM, HEEJUN JEONG, Hanyang University, MARK A. REED, Yale University — We report the observation of direct gate modulation of molecular orbitals in solid-state molecular junctions where transport current is controlled by an external gate. Resonant-enhanced coupling to the nearest molecular orbital is revealed by electron tunneling spectroscopy, demonstrating direct molecular orbital gating in an electronic device. We contrast molecular structures that have near-resonant coupling to ones that have far-from-resonant coupling. We show this using a multiprobe approach combining a variety of transport techniques that elucidates the transport mechanisms and electronic structure of molecular junctions.

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