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Controlled Charge-Flow in A Molecular Interferometer SPIROS

SKOURTIS, Department of Physics, University of Cyprus, Nicosia 1678, Cyprus, DEQUAN XIAO, Department of Chemistry, Duke University, Durham, NC 27708, DAVID BERATAN, Department of Chemistry and Department of Biochemistry, Duke University, Durham, NC 27708 — We describe an electron transfer molecule interferometer capable of controlling electron flow by inelastic tunneling manipulation. The molecule consists of electron donor and acceptor groups that are connected by a bridge. Upon photo-excitation of the molecule, an electron transfers from the donor to the acceptor group by tunneling through the bridge. The structure of the bridge is such that it provides interfering electron tunneling pathways. We show how to control interferences between the pathways by isotopic substitutions of pathway-specific bridge atoms. Such substitutions create pathway-localized bridge vibrations that can be selectively IR- excited during the electron transfer event. We suggest ways of experimentally controlling pathway interferences and electron transfer rates.

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