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Single-electron transport through a Mn_{12} (2-thiophenecarboxylate) single-molecule magnet CHRISTOPHER M. RAMSEY, ENRIQUE DEL BARCO, EDUARDO MUCCIOLO, Department of Physics, University of Central Florida, Orlando, FL, FIROZE HAQUE, SAIFUL KHONDAKER, MICHAEL LEUENBERGER, Nanoscience Technology Center, University of Central Florida, Orlando, FL, ABHUDAYA MISHRA, GEORGE CHRISTOU, Department of Chemistry, University of Florida, Gainesville, FL — We report single-electron transport measurements on Mn_{12} based single-molecule magnet, which has been functionalized with 2-thiophenecarboxylate ligands that bind to gold. The self-assembly of these molecules was confirmed by scanning probe microscopy and XPS measurements. Because it is well known that the molecule's environment within the crystal can have a profound influence on the quantum properties of the system, it is important to study the quantum spin dynamics in individual isolated molecules. Single electron transistor devices have been prepared for this purpose by electron beam lithography and electromigration. The transport properties of a single, isolated Mn_{12}(2-thiophenecarboxylate) molecule were measured down to mK temperatures in a 3-D superconducting vector magnet with arbitrary field direction. The data are characteristic of a molecular single-electron transistor device where the SMM bridges the gap between two gold nanoelectrodes. Magnetic field and temperature dependence as well as theoretical aspects will be discussed.

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