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Electrodes for Molecular Spin-Valves BRUCE HINDS, PAWAN TYAGI, STEVE HOLMES, University of Kentucky, DONGFENG LI — Realization of spin devices based on the spin-state of magnetic molecules remains a difficult challenge due to the lack of a reliable molecular electrode fabrication process. We have successfully fabricated magnetic Molecular Junctions (MJ's) by having paramagnetic molecular clusters molecules span across the surface of a metal-insulator-metal tunnel junctions (MJT) [Ta/Co/NiFe/Al_2O_3($\sim$2nm)/NiFe] at the exposed cross-junction pattern edge. Interestingly the current from $\sim 1\mu$A to $\sim$1nA (RT, 100mV bias) a short time after molecular attachment presumably due to magnetic ordering. Low temperature in-plane magnetization (77 K, 0.4T) further increased magnetic ordering and decreased the junction current to $\sim$1pA level. Magnetic force microscopy (MFM) spatially showed strong antiferromagnetic coupling between the top and bottom magnetic electrodes. SQIUD- magnetometer study on an array of MJT dots (4um diameter) showed reduction in magnetization after molecular attachment consistent with antiferromagnetic coupling and the dramatic changes in magneto-junction current (uA to pA).

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