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A 4.5 kbit molecular-electronic memory at $3x10^{10}$ elements/cm² ERICA DEIONNO, Y. LUO, E. JOHNSTON-HALPERIN, R.A. BECKMAN, J.E. GREEN, K. BEVERLY, J.R. HEATH, Department of Chemistry, Caltech, Pasadena, CA, S. NYGAAREL, J.O. JEPPSEN, Department of Chemistry, Unversity of Southern Denmark, Odense, DK, B.W. LUARSEN, J.F. STODDART, Department of Chemistry, Unviersity of California, Los Angeles, CA — We present the fabrication of 4.5 kbit random access molecular-electronic memory devices. The devices are based on a two-dimensional crossbar architecture with the bottom electrode array fabricated by SNAP and consisting of 150 n-type Si nanowires at a pitch of 34 nm, while the top electrode array is metallic and consists of 30 wires at a pitch of 100 nm fabricated by e-beam lithography. The active layer consists of a monolayer of bi-stable [2]-rotaxane supramolecule prepared on a Langmuir-Blodgett trough and deposited between the top and bottom electrodes. As a result, each crossing point between the electrodes serves as an independently addressable molecular switch tunnel junction. A group of 64 randomly selected bits from each device was tested, revealing reliable point-addressability and multiple-cycle lifetimes for individual bits.

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