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(54) **VARIABLE-PERSISTENCE MOLECULAR MEMORY DEVICES AND METHODS OF OPERATION THEREOF**

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365/153, 106

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ABSTRACT

A molecular memory cell includes first and second electrodes. First and second charge storage molecules have respective first and second oxidation potentials and are disposed between the first and second electrodes. A molecular linkage couples the first and second charge storage molecules to the first electrode and provides respective first and second electron transfer rates for the first and second charge storage molecules. The first and second different oxidation potentials are different and/or the first and second electron transfer rates are different. In particular, the second oxidation potential may be greater than the first oxidation potential and the first electron transfer rate may be greater than the second electron transfer rate, such that the first charge storage molecule may be used as fast, volatile primary memory and the second charge storage molecule can be used as slower, less volatile secondary memory. In various embodiments, memory cells can be constructed from an admixture of charge storage molecules or by using a bipartite charge storage molecule. Memory cells can include a molecular transistor incorporating such molecular structures.

64 Claims, 7 Drawing Sheets

