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Lindsey et al.

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(54) **MULTISTATE TRIPLE-DECKER DYADS IN THREE DISTINCT ARCHITECTURES FOR INFORMATION STORAGE APPLICATIONS**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(51) **Int. Cl.**⁷ **G11C 11/00**

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(52) **U.S. Cl.** **365/151; 365/173**

(57) **ABSTRACT**

(58) **Field of Search** 365/151, 106, 365/153, 173

This invention provides novel high density memory devices that are electrically addressable permitting effective reading and writing, that provide a high memory density (e.g., 10¹⁵ bits/cm³), that provide a high degree of fault tolerance, and that are amenable to efficient chemical synthesis and chip fabrication. The devices are intrinsically latching, defect tolerant, and support destructive or non-destructive read cycles. In a preferred embodiment, the device comprises a fixed electrode electrically coupled to a storage medium having a multiplicity of different and distinguishable oxidation states wherein data is stored in said oxidation states by the addition or withdrawal of one or more electrons from said storage medium via the electrically coupled electrode. The storage medium typically comprises a storage molecule that is a triple-decker sandwich heterodimer. Such dimers can provide 8 or more oxidation states and permit the storage of at least 3 bits per molecule.

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99 Claims, 33 Drawing Sheets

