



US006451942B1

(12) **United States Patent**  
**Li et al.**

(10) **Patent No.:** **US 6,451,942 B1**  
(45) **Date of Patent:** **Sep. 17, 2002**

(54) **SUBSTRATES CARRYING POLYMERS OF LINKED SANDWICH COORDINATION COMPOUNDS AND METHODS OF USE THEREOF**

4,618,509 A 10/1986 Bulkowski

(List continued on next page.)

**FOREIGN PATENT DOCUMENTS**

(75) Inventors: **Junzhong Li; Dorota Gryko; Jonathan S. Lindsey**, all of Raleigh, NC (US)

EP	0 272 935 A2	6/1988	.....	G11B/9/08
EP	0 307 210 A2	3/1989	.....	G11B/21/00
EP	0 307 211 A2	3/1989	.....	G11B/21/00
EP	0 363 147 A2	4/1990	.....	G11B/9/00

(73) Assignee: **North Carolina State University**, Raleigh, NC (US)

**OTHER PUBLICATIONS**

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

Oriol et al., Prog. Polym. Sci., 22, 873-911, 1997.\*  
Bao et al., Trends in Polymer Science, 3(5), 159-164 (1995).\*

(List continued on next page.)

(21) Appl. No.: **09/605,587**

*Primary Examiner*—David W. Wu

*Assistant Examiner*—Ling-Siu Choi

(22) Filed: **Jun. 28, 2000**

(74) *Attorney, Agent, or Firm*—Myers Bigel Sibley & Sajovec

**Related U.S. Application Data**

(57) **ABSTRACT**

(63) Continuation-in-part of application No. 09/483,500, filed on Jan. 14, 2000, now Pat. No. 6,212,093.

The present invention provides high density, non-volatile memory devices incorporating polymers comprised of sandwich coordination compounds. Such polymers can have multiple different and distinguishable oxidation states (e.g., ten different and distinguishable oxidation states), and thus provide molecules, information storage media and apparatus that store multiple bits of information. In addition, the polymers can be immobilized or bound to a substrate to produce other useful articles, such as electrochromic displays, molecular capacitors, and batteries.

(51) **Int. Cl.**<sup>7</sup> ..... **C08F 26/06**

(52) **U.S. Cl.** ..... **526/258; 526/263; 526/308; 526/259**

(58) **Field of Search** ..... **526/263, 308, 526/258, 259**

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

3,637,581 A \* 1/1972 Horiguchi et al. .... 260/41.5 R

**46 Claims, 46 Drawing Sheets-**

