



US006958270B2

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

(10) **Patent No.:** **US 6,958,270 B2**
(45) **Date of Patent:** **Oct. 25, 2005**

- (54) **METHODS OF FABRICATING CROSSBAR ARRAY MICROELECTRONIC ELECTROCHEMICAL CELLS**
- (75) Inventors: **Veena Misra**, Raleigh, NC (US); **John Damiano, Jr.**, Raleigh, NC (US)
- (73) Assignee: **North Carolina State University**, Raleigh, NC (US)
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 299 days.

(21) Appl. No.: **10/407,680**

(22) Filed: **Apr. 4, 2003**

(65) **Prior Publication Data**

US 2004/0115524 A1 Jun. 17, 2004

Related U.S. Application Data

(60) Provisional application No. 60/433,923, filed on Dec. 17, 2002.

(51) **Int. Cl.⁷** **H01L 21/8234**

(52) **U.S. Cl.** **438/257**; 438/258; 438/593; 257/313; 257/314; 257/315; 257/316

(58) **Field of Search** 438/257–258, 438/593; 257/313–316, 530; 365/65, 117, 145

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,128,214 A	10/2000	Kuekes et al.	365/151
6,208,553 B1	3/2001	Gryko et al.	365/151
6,212,093 B1	4/2001	Lindsey	365/151

6,272,038 B1	8/2001	Clausen et al.	365/151
6,351,406 B1 *	2/2002	Johnson et al.	365/103
6,451,942 B1	9/2002	Li et al.	526/258
6,483,726 B2 *	11/2002	Chen et al.	363/21.18
6,567,301 B2 *	5/2003	Anthony et al.	365/175
2003/0082444 A1	5/2003	Kuhr et al.	

FOREIGN PATENT DOCUMENTS

WO WO 02/22711 3/2002 C08G/81/00

OTHER PUBLICATIONS

Harell, S. et al.; *Microelectron Eng.* 30:11 (1996).
 Reed, M. A. et al.; *Science* 278 252–254 (1997).
 Reed, M. A.; *Proc. IEEE* 87 652–658 (1999).
 Roth, K. M. et al.; *J. Vac. Sci. Technol. B.* 18:5 2359 (2000).

* cited by examiner

Primary Examiner—Dung A. Le

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

(57) **ABSTRACT**

The present invention provides microelectronic electrochemical structures and related fabrication methods. A composite microelectronic structure is provided that includes first and second conductors dielectrically isolated from one another at a crossing thereof, the crossing surrounded by a dielectric material. A portion of the dielectric material around the crossing of the first and second conductors is removed to form a well that exposes respective outer surfaces of the first and second conductors and a molecule is deposited in the well such that the deposited molecule contacts the exposed outer surfaces of the first and second conductors.

34 Claims, 5 Drawing Sheets

