



US007247561B2

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

(10) **Patent No.:** **US 7,247,561 B2**

(45) **Date of Patent:** **Jul. 24, 2007**

(54) **METHOD OF REMOVING RESIDUAL  
CONTAMINANTS FROM AN  
ENVIRONMENT**

(75) Inventors: **Demetrius Sarigiannis**, Boise, ID (US);  
**Cem Basceri**, Boise, ID (US);  
**Christopher W. Hill**, Boise, ID (US);  
**Garo J. Derderian**, Boise, ID (US)

(73) Assignee: **Micron Technology, Inc.**, Boise, ID  
(US)

(\* ) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 199 days.

(21) Appl. No.: **10/734,525**

(22) Filed: **Dec. 11, 2003**

(65) **Prior Publication Data**

US 2005/0126585 A1 Jun. 16, 2005

(51) **Int. Cl.**  
**H01L 21/44** (2006.01)

(52) **U.S. Cl.** ..... **438/653**; 438/476; 438/685

(58) **Field of Classification Search** ..... 438/653,  
438/476, 685

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,670,571 A *	6/1987	Malpass et al. ....	556/129
5,622,565 A *	4/1997	Ye et al. ....	118/723 R
5,756,400 A *	5/1998	Ye et al. ....	438/710
5,788,778 A	8/1998	Shang et al.	
6,255,222 B1 *	7/2001	Xia et al. ....	438/710

6,267,122 B1	7/2001	Guldi et al.	
6,290,779 B1	9/2001	Saleh et al.	
6,312,569 B1	11/2001	Suzuki et al.	
6,890,596 B2 *	5/2005	Sarigiannis et al. ....	427/248.1
6,951,813 B2 *	10/2005	Derderian .....	438/653
2004/0033310 A1 *	2/2004	Sarigiannis et al. ....	427/248.1
2004/0198025 A1 *	10/2004	Derderian .....	438/476
2005/0081882 A1 *	4/2005	Greer et al. ....	134/1.1
2005/0126585 A1 *	6/2005	Sarigiannis et al. ....	134/1.1

FOREIGN PATENT DOCUMENTS

WO WO 01/29893 A1 4/2001

\* cited by examiner

*Primary Examiner*—Laura M. Schillinger

(74) *Attorney, Agent, or Firm*—TraskBritt

(57) **ABSTRACT**

A method of reducing the amount of halogenated materials in a halogen-containing environment. The method comprises introducing an aluminum compound into the halogen-containing environment, reacting the aluminum compound with the halogenated material to form a gaseous reaction product, and removing the gaseous reaction product from the environment. The aluminum compound may be a tri-alkylaluminum compound, an alane, an alkylaluminum hydride, an alkylaluminum halide, an alkylaluminum sesquihalide, or an aluminum sesquihalide. The aluminum compound may alternatively form a solid aluminum product, which is deposited on a surface associated with the halogen-containing environment or onto a semiconductor disposed therewithin. The halogenated material is incorporated into the solid aluminum product, forming an inert film within which the halogenated material is trapped.

**11 Claims, 1 Drawing Sheet**

