



US008574663B2

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

(10) **Patent No.:** **US 8,574,663 B2**

(45) **Date of Patent:** **Nov. 5, 2013**

(54) **SURFACE PAIRS**

(75) Inventors: **Avto Tavkhelidze**, Tbilisi (GE); **Misha Vepkhvadze**, Tbilisi (GE)

(73) Assignee: **Borealis Technical Limited** (GI)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1244 days.

(21) Appl. No.: **11/667,882**

(22) PCT Filed: **Nov. 17, 2005**

(86) PCT No.: **PCT/US2005/042093**

§ 371 (c)(1),
(2), (4) Date: **May 15, 2007**

(87) PCT Pub. No.: **WO2006/055890**

PCT Pub. Date: **May 26, 2006**

(65) **Prior Publication Data**

US 2008/0003415 A1 Jan. 3, 2008

Related U.S. Application Data

(60) Continuation-in-part of application No. 10/991,257, filed on Nov. 16, 2004, now abandoned, which is a continuation-in-part of application No. 10/508,914, filed as application No. PCT/US03/08907 on Mar. 24, 2003, now Pat. No. 7,074,498, application No. 11/667,882, which is a continuation-in-part of application No. 10/760,697, filed on Jan. 19, 2004, now Pat. No. 7,166,786, which is a division of application No. 09/634,615, filed on Aug. 5, 2000, now Pat. No. 6,680,214, and a continuation of application No. 09/093,652, filed on Jun. 8, 1998, now abandoned.

(60) Provisional application No. 60/149,805, filed on Aug. 18, 1999, provisional application No. 60/373,508, filed on Apr. 17, 2002, provisional application No. 60/366,563, filed on Mar. 22, 2002, provisional application No. 60/366,564, filed on Mar. 22, 2002.

(51) **Int. Cl.**
B05D 5/12 (2006.01)

(52) **U.S. Cl.**
USPC **427/97.2; 427/97.3; 427/97.7; 427/98.8; 427/99.3**

(58) **Field of Classification Search**
USPC **427/97.7, 98.8, 97.2, 99.3**
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,740,592 A 6/1973 Engdahl et al.
4,011,582 A 3/1977 Cline et al.

(Continued)

FOREIGN PATENT DOCUMENTS

DE 3404137 A1 8/1985
DE 3818192 A1 12/1989

(Continued)

OTHER PUBLICATIONS

Chou et al., "Imprint Lithography with 25 Nanometer Resolution", Science, Apr. 5, 1996, pp. 85-87, vol. 272.

(Continued)

Primary Examiner — Brian K Talbot

(57) **ABSTRACT**

The present invention is a method for fabricating an electrode pair precursor which comprises the steps of creating on one surface of a substrate one or more indents of a depth less than approximately 10 nm and a width less than approximately 1 μm; depositing a layer of material on the top of this structured substrate to forming a first electrode precursor; depositing another layer the first electrode precursor to form a second electrode precursor; and finally forming a third layer on top of the second electrode precursor.

13 Claims, 4 Drawing Sheets

