



US009411231B2

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

(10) **Patent No.:** **US 9,411,231 B2**

(45) **Date of Patent:** **Aug. 9, 2016**

(54) **SILANE COMPOSITION AND CURED FILM THEREOF, AND METHOD FOR FORMING NEGATIVE RESIST PATTERN USING SAME**

USPC 430/272.1; 528/33, 39; 428/447, 327
See application file for complete search history.

(71) Applicant: **Central Glass Company, Limited**,
Ube-shi, Yamaguchi (JP)

(56) **References Cited**

(72) Inventors: **Tsuyoshi Ogawa**, Saitama (JP); **Junya Nakatsuji**, Fujimino (JP); **Kazuhiro Yamanaka**, Tachikawa (JP)

U.S. PATENT DOCUMENTS

4,552,919 A * 11/1985 Mikami et al. 524/860
5,811,482 A * 9/1998 Sabia et al. 524/366

(73) Assignee: **Central Glass Company, Limited**,
Ube-shi (JP)

(Continued)

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

FOREIGN PATENT DOCUMENTS

JP 2-129642 A 5/1990
JP 7-247434 A 9/1995

(Continued)

(21) Appl. No.: **14/350,691**

(22) PCT Filed: **Oct. 5, 2012**

OTHER PUBLICATIONS

(86) PCT No.: **PCT/JP2012/076021**

Machine translation of JP 7-247434 (no date).*

§ 371 (c)(1),

(2) Date: **Apr. 9, 2014**

(Continued)

(87) PCT Pub. No.: **WO2013/054771**

Primary Examiner — Amanda C Walke

PCT Pub. Date: **Apr. 18, 2013**

(74) *Attorney, Agent, or Firm* — Crowell & Moring LLP

(65) **Prior Publication Data**

US 2014/0242516 A1 Aug. 28, 2014

(57) **ABSTRACT**

A composition provided to contain:

(30) **Foreign Application Priority Data**

Oct. 12, 2011 (JP) 2011-224930

Oct. 5, 2012 (JP) 2012-222769

an alkoxy silane condensate obtained by the condensation of

alkoxy silane A represented by general formula (1):
(CH₃)Si(OR¹)₃ (In the general formula (1), R¹ mutually independently represents methyl group or ethyl group.),

(51) **Int. Cl.**

G03F 7/075 (2006.01)

H01L 21/02 (2006.01)

(Continued)

alkoxy silane B represented by general formula (2): (Ph)Si(OR¹)₃ (In the general formula (2), R¹ mutually independently represents methyl group or ethyl group.), and

(52) **U.S. Cl.**

CPC **G03F 7/0757** (2013.01); **C08L 83/04** (2013.01); **C08L 83/12** (2013.01); **C09D 5/00** (2013.01);

(Continued)

alkoxy silane C represented by general formula (3): (CH₃)₂Si(OR¹)₂ (In the general formula (3), R¹ mutually independently represents methyl group or ethyl group.) at an A:B:C mole ratio within the range of 30-70:10-50:20-60; and

(58) **Field of Classification Search**

CPC G03F 7/075; C09D 183/04; C09D 183/06; C09D 5/00; C08L 83/04; H01L 21/02126

a polyether-modified polydimethylsiloxane.

10 Claims, 1 Drawing Sheet

