(12) **United States Patent**
Fujiwara

(10) **Patent No.:** **US 10,054,853 B2**
(45) **Date of Patent:** ***Aug. 21, 2018**

(54) **MONOMER, POLYMER, RESIST COMPOSITION, AND PATTERNING PROCESS**

(71) Applicant: **Shin-Etsu Chemical Co., Ltd.**, Tokyo (JP)

(72) Inventor: **Takayuki Fujiwara**, Joetsu (JP)

(73) Assignee: **SHIN-ETSU CHEMICAL CO., LTD.**, Tokyo (JP)

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

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **15/483,210**

(22) Filed: **Apr. 10, 2017**

(65) **Prior Publication Data**

US 2017/0299963 A1 Oct. 19, 2017

(30) **Foreign Application Priority Data**

Apr. 14, 2016 (JP) 2016-080899

(51) **Int. Cl.**
 G03F 7/004 (2006.01)
 G03F 7/039 (2006.01)
 (Continued)

(52) **U.S. Cl.**
 CPC *G03F 7/0392* (2013.01); *C07C 307/02* (2013.01); *C07C 311/49* (2013.01);
 (Continued)

(58) **Field of Classification Search**
 CPC G03F 7/004; G03F 7/0045; G03F 7/0046; G03F 7/0382; G03F 7/0392; G03F 7/11;
 (Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,511,169 B2 3/2009 Ohsawa et al.
7,875,746 B2 1/2011 Wada
(Continued)

FOREIGN PATENT DOCUMENTS

EP 0 473 547 A1 3/1992
EP 1 635 218 A2 3/2006
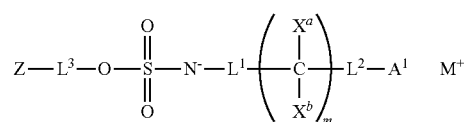(Continued)

OTHER PUBLICATIONS

Machine translation of JP 2014-167579 (no date).*
(Continued)

Primary Examiner — Amanda C Walke
(74) *Attorney, Agent, or Firm* — Westerman, Hattori, Daniels & Adrian, LLP

(57) **ABSTRACT**

A monomer having an onium salt structure represented by formula (1) gives a polymer which is fully compatible with resist components. A resist composition comprising the polymer has advantages including reduced acid diffusion, high sensitivity, high resolution, a good balance of lithography properties, and less defects, and is quite effective for precise micropatterning.

(1)

$$Z-L^3-O-\underset{\underset{O}{\overset{O}{\|}}}{S}-N^-\!-L^1\!\!\left(\!\!\begin{array}{c}X^a\\|\\C\\|\\X^b\end{array}\!\!\right)_{\!\!m}\!\!L^2-A^1 \quad M^+$$

21 Claims, 1 Drawing Sheet

EXPOSURE