



US009152050B2

(12) **United States Patent**
Hatakeyama

(10) **Patent No.:** **US 9,152,050 B2**
(45) **Date of Patent:** **Oct. 6, 2015**

(54) **RESIST COMPOSITION AND PATTERNING PROCESS**

(71) Applicant: **SHIN-ETSU CHEMICAL CO., LTD.**,
Tokyo (JP)

(72) Inventor: **Jun Hatakeyama**, 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.

(21) Appl. No.: **14/013,163**

(22) Filed: **Aug. 29, 2013**

(65) **Prior Publication Data**
US 2014/0065546 A1 Mar. 6, 2014

(30) **Foreign Application Priority Data**
Sep. 5, 2012 (JP) 2012-194753

(51) **Int. Cl.**
G03F 7/039 (2006.01)
G03F 7/20 (2006.01)
G03F 7/004 (2006.01)
G03F 7/11 (2006.01)

(52) **U.S. Cl.**
CPC **G03F 7/0397** (2013.01); **G03F 7/0045**
(2013.01); **G03F 7/0046** (2013.01); **G03F**
7/0048 (2013.01); **G03F 7/11** (2013.01); **G03F**
7/20 (2013.01)

(58) **Field of Classification Search**
CPC G03F 7/0045; G03F 7/0046; G03F 7/039;
G03F 7/0392; G03F 7/0397; G03F 7/20;
G03F 7/2002
USPC 430/270.1, 326, 907, 910, 921, 925
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,448,420	B1	9/2002	Kinsho et al.
6,746,817	B2	6/2004	Takeda et al.
7,537,880	B2	5/2009	Harada et al.
7,598,016	B2	10/2009	Kobayashi et al.
2003/0134224	A1 *	7/2003	Mizutani et al. 430/270.1
2007/0134588	A1 *	6/2007	Kanda et al. 430/270.1
2007/0178405	A1 *	8/2007	Kanda et al. 430/270.1
2008/0090172	A1	4/2008	Hatakeyama et al.
2008/0102407	A1 *	5/2008	Ohsawa et al. 430/286.1
2011/0183263	A1 *	7/2011	Takahashi et al. 430/270.1

FOREIGN PATENT DOCUMENTS

EP	0 473 547	A1	3/1992
JP	4-230645	A	8/1992
JP	3429592	B2	7/2003
JP	2005-084365	A	3/2005
JP	2006-045311	A	2/2006
JP	2006-169302	A	6/2006
JP	2006-178317	A	7/2006
JP	3865048	B2	1/2007
JP	2008-239918	A	10/2008
JP	4771974	B2	9/2011
JP	4900603	B2	3/2012

* cited by examiner

Primary Examiner — Anca Eoff

(74) *Attorney, Agent, or Firm* — Westerman, Hattori,
Daniels & Adrian, LLP

(57) **ABSTRACT**

A polymer capable of increasing alkali solubility under the action of acid, as a base resin is blended with a polymer comprising recurring units derived from a styrene having 1,1,1,3,3,3-hexafluoro-2-propanol as a polymeric additive to formulate a resist composition. The photoresist film formed using the resist composition is effective for minimizing out-gassing therefrom during the EUV lithography, reducing LWR after development, and suppressing formation of blob defects after development because of its hydrophilic surface.

7 Claims, No Drawings