

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
25 June 2009 (25.06.2009)

PCT

(10) International Publication Number
WO 2009/078968 A1

(51) International Patent Classification:

H01L 21/302 (2006.01) *H01L 21/304* (2006.01)

(21) International Application Number:

PCT/US2008/013696

(22) International Filing Date:

12 December 2008 (12.12.2008)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/013,950 14 December 2007 (14.12.2007) US
12/131,660 2 June 2008 (02.06.2008) US

(71) Applicant (for all designated States except US): **LAM RESEARCH CORPORATION** [US/US]; 4650 Cushing Parkway, Fremont, CA 94538 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **MUI, David, S., L.** [US/US]; 48472 Arkansas Place, Fremont, CA 94539 (US). **SRINIVASAN, Satish** [IN/US]; 3939 Monroe Avenue, #124, Fremont, CA 94536 (US). **PENG, Grant** [US/US]; 32 Mission Cielo Avenue, Fremont, CA 94539 (US). **ZHU, Ji** [CN/US]; 3101 Carlson Blvd., Apt. #4, El Cerrito, CA 94530 (US). **KON, Shih-Chung** [—/US];

135 Rio Robles East, #305, San Jose, CA 95134 (US). **PODLESNIK, Dragan** [US/US]; 1885 Guinda Street, Palo Alto, CA 94303 (US). **MENDIRATTA, Arjun** [US/US]; 2936 Harper Street, Fl. 1, Berkeley, CA 94703 (US).

(74) Agent: **CHENG, Lie-Yea**; Martine Penilla & Gencarella, LLP, 710 Lakeway Drive, Suite 200, Sunnyvale, CA 94085 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL,

[Continued on next page]

(54) Title: METHODS FOR PARTICLE REMOVAL BY SINGLE-PHASE AND TWO-PHASE MEDIA

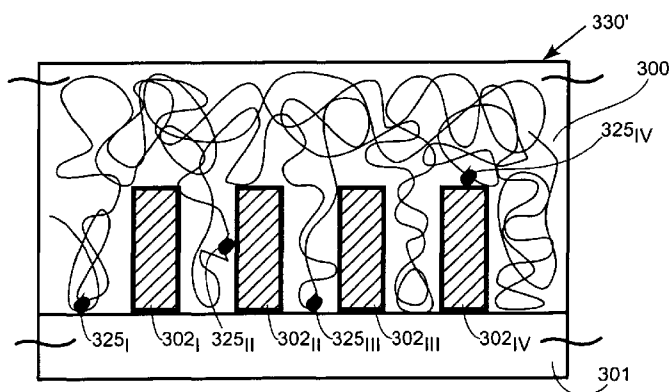


FIG. 3D

(57) Abstract: The embodiments of the present invention provide methods for cleaning patterned substrates with fine features. The methods for cleaning patterned substrate have advantages in cleaning patterned substrates with fine features without substantially damaging the features by using the cleaning materials described. The cleaning materials are fluid, either in liquid phase, or in liquid/gas phase, and deform around device features; therefore, the cleaning materials do not substantially damage the device features or reduce damage all together. The cleaning materials containing polymers of a polymeric compound with large molecular weight capture the contaminants on the substrate. In addition, the cleaning materials entrap the contaminants and do not return the contaminants to the substrate surface. The polymers of one or more polymeric compounds with large molecular weight form long polymer chains, which can also be cross-linked to form a network (or polymeric network). The long polymer chains and/or polymer network show superior capabilities of capturing and entrapping contaminants, in comparison to conventional cleaning materials.

WO 2009/078968 A1



NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG,
CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— *before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments*

Published:

— *with international search report*