9904938-9
IPOS COPY

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :
H01L 21/306, 21/3213, H01J 37/305, H01L 21/465

A1

(11) International Publication Number: **WO 98/47172**

(43) International Publication Date: 22 October 1998 (22.10.98)

(21) International Application Number: PCT/US98/07729

(22) International Filing Date: 15 April 1998 (15.04.98)

(30) Priority Data:
08/834,356 16 April 1997 (16.04.97) US

(71) Applicant: MICRION CORPORATION [US/US]; One Corporation Way, Peabody, MA 01960-7990 (US).

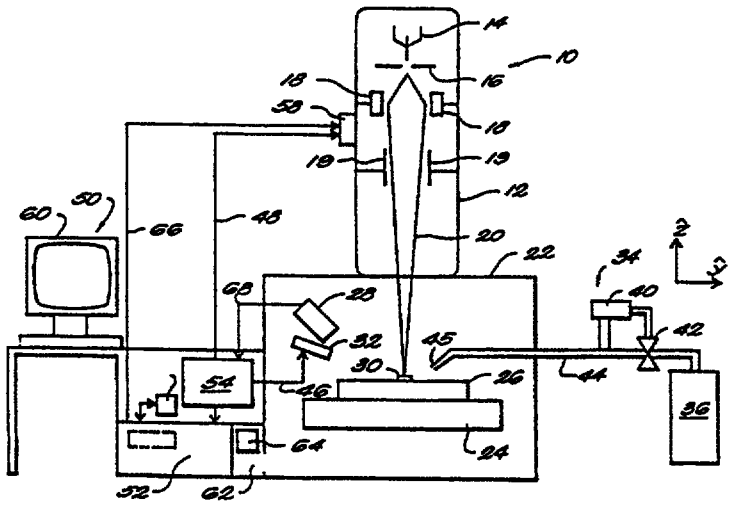
(72) Inventors: CASEY, J., David, Jr.; 35 Atlantis Street, West Roxbury, MA 02132 (US). DOYLE, Andrew; 23 Old Stagecoach Road, Epping, NH 03046 (US).

(74) Agents: LIEPMANN, W., Hugo et al.; Lahive & Cockfield, LLP, 28 State Street, Boston, MA 02109 (US).

(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: PATTERN FILM REPAIR USING A GAS ASSISTED FOCUSED PARTICLE BEAM SYSTEM



(57) Abstract

The present invention generally provides methods for employing a focused particle beam system in the removal of an excess portion from a workpiece having an opaque film patterned on a substrate and more particularly provides methods of gas-assisted etching using an etching gas including bromine. One aspect of the invention provides a method including the steps of (i) mounting the workpiece on a movable stage capable of movement in the X and Y directions, (ii) scanning a selected surface area of a workpiece, having an opaque film patterned on a substrate, with a focused particle beam, (iii) detecting intensities of particles emitted from the workpiece as a result of the workpiece scanning step, (iv) determining a shape of the patterned film based on the detected particle intensities, (v) determining an excess portion of the patterned film based on the shape of the patterned film, (vi) etching the excess portion with the focused particle beam, and (vii) introducing an etching gas, concurrent with the etching step, in selected proximity to the excess portion. The etching gas includes bromine or a bromine-containing material. The etching gas can futher include water vapor.

9904938 - 9 11 OCT 1999