United States Patent [19]

Gordon

[11] **Patent Number: 5,066,616**

[45] **Date of Patent: Nov. 19, 1991**

[54] **METHOD FOR IMPROVING PHOTORESIST ON WAFERS BY APPLYING FLUID LAYER OF LIQUID SOLVENT**

[75] Inventor: **William G. Gordon**, Corvallis, Oreg.

[73] Assignee: **Hewlett-Packard Company**, Palo Alto, Calif.

[21] Appl. No.: **581,248**

[22] Filed: **Sep. 7, 1990**

Related U.S. Application Data

[63] Continuation of Ser. No. 365,870, Jun. 14, 1989, abandoned.

[51] **Int. Cl.**[5] **H01L 21/00**; H01L 21/02; H01L 21/30; B05D 1/40

[52] **U.S. Cl.** **437/229**; 437/225; 437/228; 437/231; 148/DIG. 137; 426/96; 426/240

[58] **Field of Search** 437/225, 228, 229, 231; 148/DIG. 137; 118/52, 55, 320; 427/96, 99, 240; 430/5, 272, 298, 312, 327, 394

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,113,492	9/1978	Sato et al.	427/240
4,143,189	3/1979	Woods et al.	427/393.5
4,188,707	2/1980	Asano et al.	437/155
4,278,754	7/1981	Yamashita et al.	427/43.1
4,290,384	9/1981	Ausschnitt et al.	118/722
4,393,807	7/1983	Fujimura et al.	118/52
4,658,495	4/1987	Flatley et al.	437/191
4,661,431	4/1987	Bujese et al.	430/216
4,696,885	9/1987	Vijan	427/96
4,741,926	5/1988	White et al.	437/231
4,800,836	1/1989	Yamamoto et al.	118/52

FOREIGN PATENT DOCUMENTS

2743011	3/1979	Fed. Rep. of Germany .
0085524	5/1985	Japan .
0081625	4/1986	Japan .
0091655	5/1986	Japan .
0150332	7/1986	Japan .
0058375	3/1989	Japan .

OTHER PUBLICATIONS

Moreau, W., Coating Solvent for Resist Films, IBM Tech. Dis. Bull. (USA), vol. 23, No. 3, p. 991, Aug. 1980.

Holihan, J., Controlled Gap Photoresist Spinning Process, IBM Tech. Dis. Bull. (USA), vol. 17, No. 11, p. 3281, Apr. 1975.

Wolf, S., Silicon Processing for the VLSI Era, vol. 1, pp. 430–434, Lattice Press, 1986.

Primary Examiner—Brian E. Hearn
Assistant Examiner—B. Everhart

[57] **ABSTRACT**

A method for applying photoresist to a top surface of a semiconductor wafer for defining an electronic circuit pattern. The wafer is placed on a horizontal turntable and liquid solvent is dispensed onto the wafer's top surface. Spinning the wafer distributes the solvent to a substantially uniform film thickness over the entire top surface. Liquid photoresist is dispensed onto the top surface over the solvent film, preferably while spinning the wafer, to distribute a photoresist layer over the entire top surface. Photoresist discharge is controlled so that the wafer sirface remains entirely wetted by the solvent film during distribution of the liquid photoresist. The solvent viscosity is lower than the liquid photoresist viscosity and the solvent film thickness is sufficient to enable the photoresist to fully cover any bare silicon, high density or undercut circuit features, generally in a range of 500 to 10,000 Angstroms and preferably 1,000 to 5,000 Angstroms.

20 Claims, 1 Drawing Sheet