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Nelson et al.

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[54] **USE OF MIXTURES OF ETHYL LACTATE AND N-METHYL PYRROLIDONE AS AN EDGE BEAD REMOVER FOR PHOTORESISTS**

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Related U.S. Application Data

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[51] **Int. Cl.** ⁶ **G03F 7/38**

[52] **U.S. Cl.** **430/326; 430/192; 430/325; 430/326; 430/330; 430/331**

[58] **Field of Search** **430/325, 326, 430/331, 192, 330**

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,886,728	12/1989	Salamy et al.	430/331
4,983,490	1/1991	Durham	430/169
5,039,594	8/1991	Durham	430/326
5,151,219	9/1992	Salamy et al.	252/364
5,362,608	11/1994	Flaim et al.	430/331
5,426,017	6/1995	Johnson	430/331
5,637,436	6/1997	Johnson	430/331

OTHER PUBLICATIONS

Lattice Press, 1986, "Silicon Processing for the VLSI ERA, vol. 1: Process Technology" S. Wolf and R.N. Tauber, pp. 429-434.

Semiconductor International, Feb. 1988, "Applying Photoresist for Optimal Coatings", K. Skidmore, pp. 57-62.

Sematech, Chemical and Physical Properties of Semiconductor Process Chemicals, 93081774A-TR, Oct. 1993.

Defect Density Reduction Utilizing Wafer Edge Resist Removal, Microcontamination, N. Durant and P. Jenkins, Apr. 1985, pp. 45-51.

"Encyclopedia of Occupational Health and Safety" (Ed L., Geneva Switzerland, 3rd Edition, 1989) pp. 2065-2069, L. Parmeggian.

Derwent, JP 6184595 Jul./94, Nitto Chemical Ind. Co. Ltd. Derwent, JP 6212193 08/94, Magase denshi Kagaku KK and Nitto Chemical Ind. Co.

"American Industrial Hygiene Assoc.: Odor Thresholds for Chemicals with Established Occupational Health Standards", Akron, OH, Handbook of Chemistry and Physics, 1983-1984, Boca Raton, FL.

Air & Waste management Association, J. Air Waste Management Assoc., Oct. 1991, vol. 41, No. 10, pp. 1360-1363, "The Odor Impact Model" G.Z. Nagy.

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[57] **ABSTRACT**

The invention provides a process for removing unwanted photoresist material from the periphery of a photoresist-coated substrate using a solvent composition of ethyl lactate and N-methyl pyrrolidone, where the amount of N-methyl pyrrolidone ranges from about 3% to about 20% by weight of the total composition, and where the solvent composition has a flash point of greater than 100° F. (38° C.), has an odor threshold value greater than 5000, is effective as both a backside and topside edge bead remover and can effectively remove the edge bead from an unbaked or baked photoresist film.

14 Claims, No Drawings