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Ushijima

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[54] **METHOD AND APPARATUS FOR MANUFACTURING A SEMICONDUCTOR DEVICE**

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Related U.S. Application Data

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** **430/30;** 430/311; 156/626; 356/355; 356/357; 356/381; 356/444
[58] **Field of Search** 430/30; 356/381, 444, 356/357, 355; 156/626

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,707,760 1/1973 Citrin 29/413
4,121,936 10/1978 Matsuda et al. 96/35.1
4,285,433 8/1981 Garrett et al. 209/573
4,500,615 2/1985 Iwai 430/30
4,738,910 4/1988 Ito et al. 430/30
4,778,326 10/1988 Althouse et al. 414/786
4,841,156 6/1989 May et al. 250/458.1
4,851,311 7/1989 Millis et al. 430/30
4,977,330 12/1990 Batcheder et al. 356/381
5,220,405 6/1993 Barbee et al. 356/357

FOREIGN PATENT DOCUMENTS

0507589A2 7/1992 European Pat. Off. 430/30
61293114 3/1988 Japan .
143816 6/1988 Japan 430/30
63-293114 6/1988 Japan 430/30
1228130 8/1988 Japan 430/30

OTHER PUBLICATIONS

Elliott, David J. Integrated Circuit Fabrication Technology; McGraw-Hill Book Co., 1982 pp.-21, 112, 113, 145.

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[57] **ABSTRACT**

A method of manufacturing a semiconductor device of this invention relates to a method of manufacturing a semiconductor device with ultra-micropattern electrodes. Light is projected on a resist film, and reflected light from a region on which no semiconductor chip is formed, i.e., a flat region is detected to measure the thickness of the resist film. Based on the measured thickness, at least one of the resist film forming step, the exposing step, and the developing step is controlled, so that the electrodes have a desired width.

6 Claims, 9 Drawing Sheets