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(54) **METHOD FOR COMPENSATING EFFECT OF PATTERNING PROCESS AND APPARATUS THEREOF**

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None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,260,812 B2 8/2007 Melvin, III et al.
7,318,214 B1 1/2008 Prasad et al.

7,487,490 B2 * 2/2009 Zhang et al. 716/50
7,533,363 B2 * 5/2009 Zhang et al. 716/55
8,336,003 B2 * 12/2012 Cheng et al. 716/53
2005/0091632 A1 * 4/2005 Pierrat et al. 716/20
2005/0223350 A1 * 10/2005 Zhang et al. 716/21

OTHER PUBLICATIONS

Painter, et al., Classical Control Theory Applied to OPC Correction
Segment Convergence, Proc. of SPIE, vol. 5377, 2004, pp. 1198-
1206.

* cited by examiner

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(57) ABSTRACT

A method for compensating an effect of a patterning process is illustrated. The main concept of the method for compensating the effect of the patterning process is to add or subtract the correction amounts for all segments according to the set of the comparison values at the set of the evaluation points. Compared with the delta-chrome optical proximity correction method, the run time of the method for compensating the effect of the patterning process is reduced, the memory usage of the method for compensating the effect of the patterning process not increased, and the correction accuracy of the method for compensating the effect of the patterning process is not reduced.

20 Claims, 6 Drawing Sheets

