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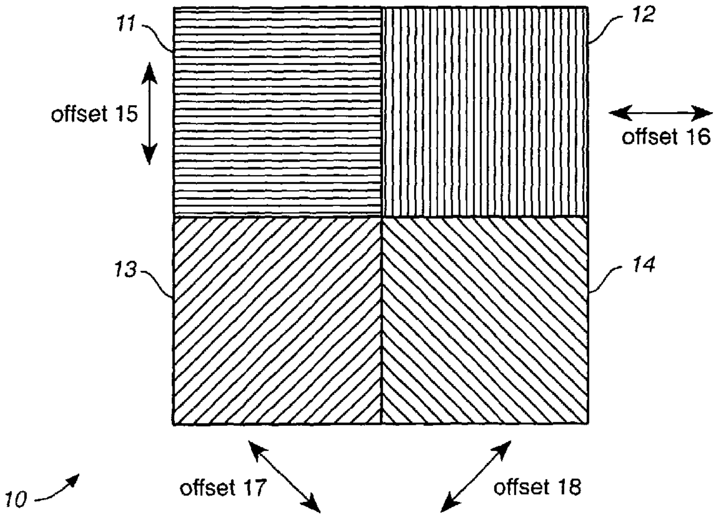
(54) Title: GRATING TEST PATTERNS AND METHODS FOR OVERLAY METROLOGY



(57) **Abstract:** A metrology for determining bias or overlay error in lithographic processes. This metrology includes a set of diffraction test patterns, optical inspection techniques by using spectroscopic ellipsometer or reflectometer, a method of test pattern profile extraction. The invention uses a set of diffraction gratings (10) as the test patterns, and thin film metrology equipment, such as spectroscopic ellipsometer or spectroscopic reflectometer. The profiles of the test patterns in the two successive layers are analyzed. Overlay information are obtained after processing the profile data. In a first aspect of the invention, a line-on-line overlay grating test patterns structure is disclosed in which a second layer mask is placed in the center of a clear line in a first layer mask. In a second aspect of the invention, a line-on-line overlay grating test patterns structure is disclosed in which a second layer mask is placed in the center of a dark line in the first mask.

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A. CLASSIFICATION OF SUBJECT MATTER
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G03F H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 281 030 A (IBM) 7 September 1988 (1988-09-07)	1-23
Y	page 1, line 40-46; claim 1; figures 2-4,10	24,25
Y	EP 0 422 395 A (IBM) 17 April 1991 (1991-04-17) figure 4	24,25
X	US 4 332 473 A (ONO AKIRA) 1 June 1982 (1982-06-01) the whole document	23
A	US 5 347 356 A (KOMATSU KOUICHIRO ET AL) 13 September 1994 (1994-09-13) figure 5	

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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search 19 May 2003	Date of mailing of the international search report 09/07/2003
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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