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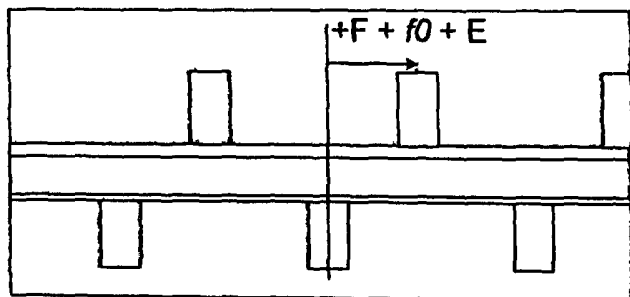
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(54) Title: APPARATUS AND METHOD FOR DETECTING OVERLAY ERRORS USING SCATTEROMETRY

With Offsets  $F + f_0$  and Overlay Error  $E$



(57) Abstract: Disclosed is a method of determining an overlay error between two layers of a multiple layer sample. For a plurality of periodic targets that each have a first structure formed from a first layer and a second structure formed from a second layer of the sample, an optical system is employed to thereby measure an optical signal from each of the periodic targets. There are predefined offsets between the first and second structures. An overlay error is determined between the first and second structures by analyzing the measured optical signals from the periodic targets using a scatterometry overlay technique based on the predefined offsets. The optical system comprises any one or more of the following apparatuses: a reflectometric, an ellipsometric, imaging, interferometric, and/ or scanning angle system.

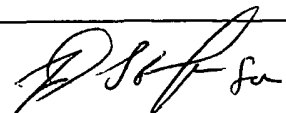


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<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
IPC(7) : G01B 11/00		
US CL : 356/401		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) U.S. : 356/399-401; 355/53,55; 430/5,22,30; 250/548		
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 practicable, search terms used) EAST		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2003/0011786 A1 (LEVY et al) 16 January 2003 (16.01.2003), Figure 11a, paragraphs 0026, 0170, 0193, 0207, 0275, 0278, and 0333.	50 ----- 5, 6, 11-19, 21-27, 29, 32, 35-37, 39-41, 47
X --- Y	US 2003/0002043 A1 (ABDULHALIM et al) 02 January 2003 (02.01.2003), paragraphs 0038 and 0051-0053.	49, 51, 52, ----- 2, 3, 9, 10
A	US 6,486,954 B1 (MIEHER et al) 26 November 2002 (26.11.2002), see whole document.	1-54
X --- Y	WO 02/065545 A2 (SEZGINER et al) 22 August 2002 (22.08.2002), Figures 5-7, 19, 20; pages 13-15 and 19-23.	1, 4, 7, 42-46, ----- 2, 3, 5, 6, 9-19, 21-27, 29, 30, 32-37, 39-41, 47, 48
Y	US 2002/0054290 A1 (VURENS et al) 09 May 2002 (09.05.2002), paragraph 0101	33
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## INTERNATIONAL SEARCH REPORT

## C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,350,548 B1 (LEIDY et al) 26 February 2002 (26.02.2002), Figure 5.	53
X	US 5,808,742 A (EVERETT et al) 15 September 1998 (15.09.1998), Figures 4, 6, 7, 9, 10, 12, 13; columns 5-7.	54
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Y		48
Y	US 5,276,337 (STARIKOV) 04 January 1994 (04.01.1994), column 1, lines 30-40; column 2, lines 40-65.	30, 34