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(71) **Applicant** *(for all designated States except US)*: **FREESCALE SEMICONDUCTOR INC.** [US/US]; 6501 William Cannon Drive West, Austin, Texas 78735 (US).

(72) **Inventors; and**

(75) **Inventors/Applicants** *(for US only)*: **POL, Victor** [US/US]; 12814 Hunters Chase Drive, Austin, Texas 78729 (US). **FU, Chong-Cheng** [US/US]; 34 Pascal Lane, Austin, Texas 78746 (US).

(74) **Agents**: **WUAMETT, Jennifer** et al.; 7700 W. Parmer Lane, MD: TX32/PL02, Austin, TX 78729 (US).

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[Continued on next page]

(54) **Title**: SEMICONDUCTOR WAFER HAVING SCRIBE LANE ALIGNMENT MARKS FOR REDUCING CRACK PROPAGATION

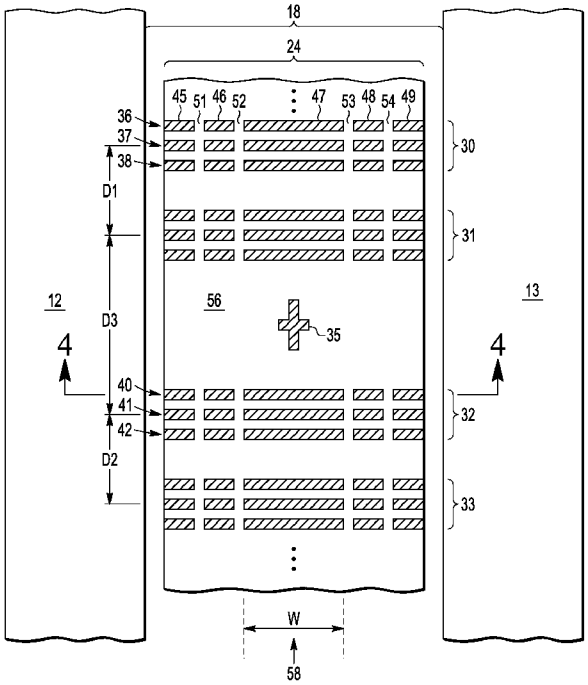

FIG. 2

(57) **Abstract**: A wafer (10) including at least a first die (12) and at least a second die (13), wherein the first die and the second die are separated from each other by an area located between the first die and the second die, is provided. The wafer further includes an alignment mark group (31) used for aligning the wafer to a tool used for patterning the wafer (10). The alignment mark group (31) is located entirely within the area between the first die (12) and the second die (13) and the alignment mark group includes a plurality of alignment lines (36, 37, 38), and wherein each line of the plurality of alignment lines is formed using a plurality of segments (45, 46, 47, 48, 49) separated from each other by a plurality of gaps (51, 52, 53, 54) filled with an insulating material.

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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)

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: wafer, alignment, mark, segment, gap

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 05525840 A (TOMINAGA; MAKOTO) 11 June 1996 See column 5, line 50-column 6, line 2;claim 1;figure 6.	1-20
A	US 2002-0094679 A1 (WON SONG et al.) 18 July 2002 See abstract;paragraphs [0034]-[0049];claim 1;figures 8A-8B,9A-9B.	1-20
A	US 04981529 A (TSUJITA; KOUICHIROU) 01 January 1991 See column 6, lines 30-59;claim 1;figure 1.	1-20
A	KR 10-2003-0041015 A (HYNIX SEMICONDUCTOR INC.) 23 May 2003 See abstract;page 3;claim 1;figures 3-9.	1-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
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Authorized officer

Lee, Byul Sup

Telephone No. 82-42-481-8497

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Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 05525840A A	11.06.1996	JP 02595885 B2	09.01.1997
		JP 07-142379 A	02.06.1995
		JP 2595885 B2	02.04.1997
US 2002-0094679 A1	18.07.2002	JP 2002-231620 A	16.08.2002
		KR 10-0500469 B1	12.07.2005
		KR 10-2002-0061032 A	22.07.2002
		US 2004-0087249 A1	06.05.2004
		US 6667253 B2	23.12.2003
		US 6888261 B2	03.05.2005
US 04981529A A	01.01.1991	JP 01-042128 A	14.02.1989
		JP 02710935 B2	24.10.1997
		JP 2710935 B2	10.02.1998
KR 10-2003-0041015 A	23.05.2003	None	