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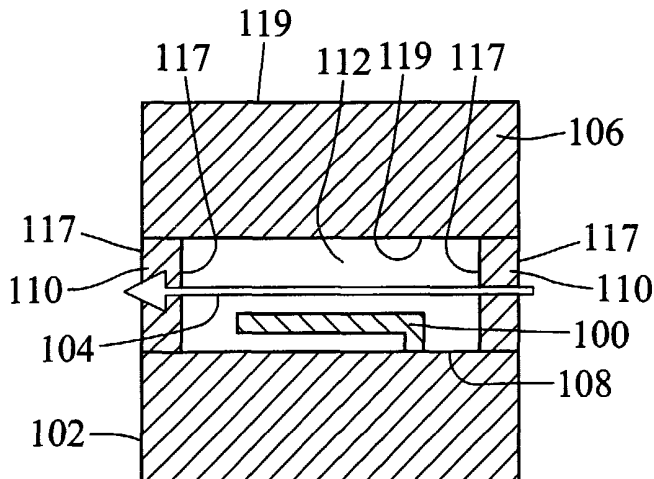
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: ACROSS-WAFER OPTICAL MEMS DEVICE AND PROTECTIVE LID HAVING ACROSS-WAFER LIGHT-TRANSMISSIVE PORTIONS



(57) Abstract: An across-wafer optical MEMS device (100) includes a protective lid (106) having across-wafer light-transmissive portions (110). The across-wafer optical MEMS device (100) allows light to pass in a direction (104) substantially parallel to a surface on which the optical MEMS device (100) is mounted. The light-transmissive portions (110) in the protective lid (106) allow light to pass from an optical device located on one side of the optical MEMS device (100) to a second device located on another side of the optical MEMS device (100). A plurality of optical MEMS devices (100) can be located on the substrate (102) and enclosed by the same lid (106) without wafer-level encapsulation of each optical MEMS device (100).



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/49357

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G02B 6/35
 US CL : 385/18, 19

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)
 U.S. : 385/16, 17, 18, 19, 20, 21, 22, 23, 24; 359/127, 128

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
 NONE

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---------------|---|--|
| X --- A | US 4,844,577 A (NINNIS et al) 04 July 1989 (04.07.1989), Figure 9. | 1-5,11,12,14-17,19-24,30,31,33-36,38 ----- 13,32 |
| X | US 5,774,604 A (MCDONALD) 30 June 1998 (30.06.1998), Figures 2a, 2b and 3. | 1-4,7,14-23,26,33-47 |
| X | US 5,841,917 A (JUNGERMAN et al) 24 November 1998 (24.11.1998), see entire document. | 39-41,43-47 |
| X | US 5,995,688 A (AKSYUK et al) 30 November 1999 (30.11.1999), Figures 1, 6 and 7. | 1-5,9,14-24,28,33-47 |
| X | US 6,108,466 A (AKSYUK et al) 22 August 2000 (22.08.2000), see entire document. | 1-4,6,15-23,25,34-38 |
| X,P | US 6,195,478 B1 (FOUQUET) 27 February 2001 (27.02.2001), Figures 8 and 9. | 1-5,9,14-24,28,33-47 |
| X,E | US 6,385,364 B1 (ABUSHAGUR) 07 May 2002 (07.05.2002), Figures 6 and 9. | 1-4,10,14-19,20-23,29,33-47 |
| X | LAU, MEM's The Word For Optical Beam Manipulation. Circuits & Devices July 1997, pages 11-18, especially Figure 14. | 1-4,8,14-23,27,33-41,43-47 |

Further documents are listed in the continuation of Box C. See patent family annex.

| | | |
|---|-----|--|
| * Special categories of cited documents: | "T" | later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention |
| "A" document defining the general state of the art which is not considered to be of particular relevance | "X" | document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone |
| "E" earlier application or patent published on or after the international filing date | "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 |
| "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) | "&" | document member of the same patent family |
| "O" document referring to an oral disclosure, use, exhibition or other means | | |
| "P" document published prior to the international filing date but later than the priority date claimed | | |

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/49357

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claim Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation Sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/49357

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claims 1-38, drawn to an across-wafer optical microelectromechanical system.

Group II, claims 39-47 drawn to a method for passing light through an optical MEMS device package in across-wafer direction.

The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: The special technical feature of Group I is the protective lid covering the optical MEMS device claimed therein while the special technical feature of Group II is passing light through a first light-transmissive portion of an optical MEMS device package and passing the light from the optical MEMS device package through a second light-transmissive portion.

Continuation of B. FIELDS SEARCHED Item 3:

USPTO EAST

search terms: optical, optic, switch, swswitching, MEMS, MEOMS, matrix, array, lid, cover, protect, magnetic, bimetallic, rotate