

Communications Engineering | Technology Offer

Monolithically integrated optical fiber coupling incorporating 90° beam deflection

Field of application

Optical signal transmission, e.g. in computer systems with optical fibers in particular in combination with VCSELs (Vertical Cavity Surface Emitting Lasers) and photodiodes, is a promising technique to enhance existing transmission systems. At present, coupling between optical fibers and VCSELs or photodiodes is being achieved with connectors or especially polished optical fibers, which deflect the beam by 90° and have to be positioned with great accuracy relative to the VCSEL or photodiode and then fixed.

Drawbacks of current technologies

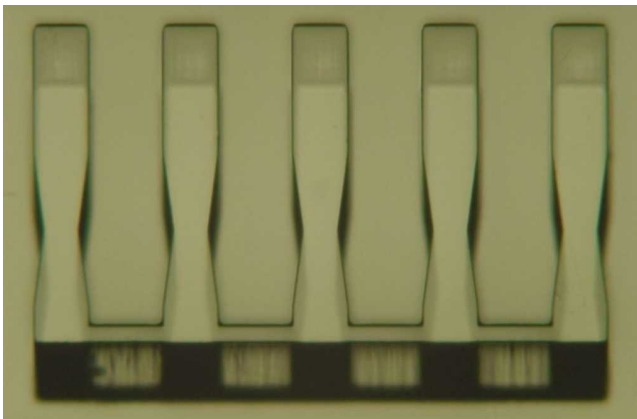
For use in large-scale production, cost effective technologies are necessary. In addition, the size of a coupling unit has to be kept very small for use in microelectronics. Available connectors however are very large and expensive. Use of especially polished optical fibers make small-size connections possible, but they are expensive to produce and time consuming to mount.

Secure your innovation advantage

At the Universität Mannheim (Germany) a new cost effective coupling technology was developed, which allows the connection of groups of VCSELs or photodiodes with optical fibers in limited space. It can be produced and handled with limited resources.

Patent situation

German Patent DE 10 2004 038 530 B3 granted and US patent US 7,218,804 B2 granted.



Micrograph of 4 couplings for 125µm optical fibers. 90° beam deflection can be seen in the lower part of the figure.

Innovation

The invention covers a new kind of monolithically integrated optical fiber coupling and their fabrication method. The production method uses standard semiconductor manufacturing technologies. It integrates fiber mount, fiber support and 90° deflection into one unit by a single fabrication process. The method has been laboratory tested and prototypes are available.

Your advantages at a glance:

- Small size of coupling units
- Simplified fiber alignment (passive alignment)
- Index matching for higher signal power transmission
- Adjustment of whole wafer in a single production step
- Low unit cost

Fabrication of monolithic fiber coupling using standard wafer fabrication technologies allows processes to be optimally adjusted to the fabrication processes of the VCSELs or photodiodes. Fabrication, connection and adjustment of whole wafer stacks, incorporating VCSELs, photodiodes and optical fiber couplings, and subsequent separation of the single units makes it possible to build any combination of VCSELs and photodiodes with optical fiber coupling. This opens up new fields of application for optical signal/data transmission by optical fibers in microelectronics and information technology.

Technology transfer

The Technologie-Lizenz-Büro GmbH (Germany) on behalf of the Universität Mannheim offers interested companies the opportunity to acquire an appropriate licence for this innovative technology. Furthermore, the research group is interested in industry collaboration to undertake further joint developments.

For further information on

„**fiber coupling**“,

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