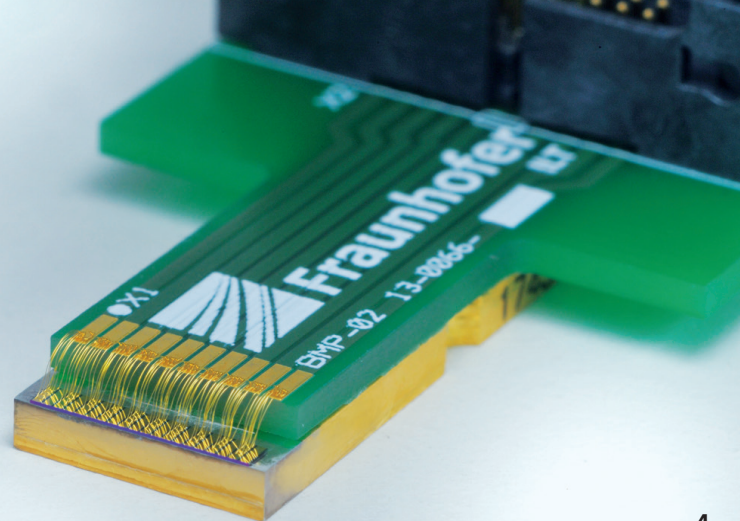


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## DIODE-LASER MODULE WITH TEN INDIVIDUALLY ADDRESSABLE FIBER-COUPLED EMITTERS

### Task

For applications in medical technology, a compact, fiber-coupled diode laser module is required which can manipulate and switch aqueous micro-fluid flows optically. The beam source shall be integrated in a compact tabletop device and simultaneously supply multiple micro-fluid flow switches with optical power. For a sufficient absorption of radiation in water, an emission wavelength of 2  $\mu\text{m}$  is required.

### Method

With regard to a compact construction, a GaSb diode laser bar is used with ten individually addressable emitters at central wavelengths between 1900 and 2000 nm. The laser radiation from each of the emitters is coupled to single optical fibers with a 105-micron core diameter. The optical design is aligned to a small number of adjustable micro-optical components at high coupling efficiency.

### Result

The modules built achieve a maximum optical output of 500 mW per fiber with a coupling efficiency of up to 60 percent. Here, the coupling efficiency is limited by the slow-axis divergence angle of the laser diode emitters used. The use of these diode laser modules in fluid-switch systems has been successfully demonstrated.

### Applications

This diode laser module serves as a beam source for a compact medical analytical system used to select and sort pathogens. It enables physicians to make early diagnoses and targeted treatment of sepsis disease (blood poisoning). In addition, the module developed by Fraunhofer ILT can be used to reduce both the costs and size of beam sources in the field of laser marking and lithography.

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3 Diode laser module.

4 Individually addressable diode laser bar.