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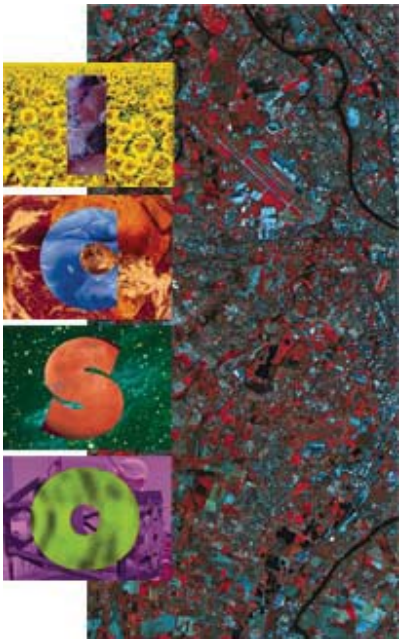

Wavelength control of a DBR laser diode using a micromachined external mirror

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ABSTRACT

WAVELENGTH CONTROL OF A DBR LASER DIODE USING A MICROMACHINED EXTERNAL MIRROR

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Single-mode wavelength-stabilized light sources are key devices for spectroscopic applications, optical sensors, wavelength division multiplexing systems. Among the variety of wavelength stabilization schemes, external cavity lasers have been widely used to achieve, with narrow spectral linewidth and wavelength tunability, stable single mode oscillation at a specified wavelength.

In this paper, we introduce a new concept of external cavity laser diode based on hybrid integration onto a silicon motherboard of a DBR (Distributed Bragg Reflector) laser diode with a movable microelectromechanical silicon micromirror. This hybrid external cavity laser source is attractive for its ability to realize an efficient miniaturized source offering several key advantages such as reduced vulnerability to vibrations, improved reliability and robustness. This microsource allows a simple implementation at the level system, eliminating the additional coupling elements and the critical optical alignments of the external cavity.
The basic principle of this novel source is demonstrated from the experimental investigation of the wavelength stability and the wavelength tunability achieved by the displacement of the mirror in front of the DBR laser. Reproducible, and stable spectral characteristics are achieved, showing an efficient control of the wavelength by the displacement of the mirror, without means of antireflective coatings on the laser. We present and discuss the design and the fabrication process of the microsource based on the hybrid integration of the laser diode with the silicon micromirror.