Industry Center
AVAILABLE TECHNOLOGIES at UC SANTA BARBARA
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TUNABLE VERTICAL CAVITY LASER

BACKGROUND: Vertical-cavity surface-emitting lasers (VCSELs) have been used to implement tunable lasers by using a single active region and by tuning the resonance of the optical cavity incorporating that active region. However, lasers produced by these methods possess a limited wavelength range, as well as output power due to the limited bandwidth of the gain region.

DESCRIPTION: Scientists at the University of California have developed a novel tunable Vertical-Cavity Tunable laser by using a two-dimensional (2-D) array of variable wavelength VCSELs.

APPLICATIONS: This new UC invention has several applications, such as:

- fiber optic networks;
- instrumentation lasers;
- optical spectroscopy.

ADVANTAGES: The new UC technology provides the following benefits:

- Eliminates fundamental limits to the wavelength range, except for those imposed by chromatic dispersion of the collimating optics, and in the case of optically-pumped VCSEL elements, the chosen pump wavelength;
- The pump laser can be separately optimized for high-power emission and reliability, and its excess heat can be located remotely from the 2-D VCSEL array;
- A movable mirror allows separate optimization of the VCSEL and mirror performance since the movable mirror is not part of the optical cavity of the VCSEL;
- Multiple, individually addressable and optimized VCSEL elements can be coupled into a common fiber.

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