news & features

14 December 2006

Just pour water over it

Microfluidic tuning of quantum cascade lasers

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Although quantum cascade lasers (QCL) are rather complex structures, they represent the most successful approach for fabricating compact lasers in the mid-infrared wavelength region, which is important for molecular sensing applications. However, once the laser has been grown, its emission wavelength is fixed and can only be modified by cumbersome processes such as heating the device. Laurent Diehl and colleagues have now come up with an ingenious solution to control the QCL emission wavelength in a microfluidic environment[1] (#b1). Their approach is based on the indirect control over the emission wavelength exercised by a regular grating, the distributed Bragg reflector, which is grown on top of the laser active region. The regular structure of the grating interacts with the optical laser mode and thus determines the precise emission wavelength. As Diehl and co-workers have shown, guiding a fluid directly to the grating modifies its refractive index contrast and thereby changes the laser wavelength. Using fluids of different refractive indices, the authors show this to be a convenient and flexible approach to tune the laser emission wavelength. The first realisation of this integrated device is a promising step towards more sophisticated lab-on-a-chip applications.

References

1. Diehl L. *et al.* Microfluidic tuning of distributed feedback quantum cascade lasers. *Opt. Expr.* **14,** 11660–11667 (2006)