15 times larger than that of a bare planar InAs substrate. The researchers suggest that the presence of a low-energy acoustic surface plasmon mode was responsible for terahertz emission. *NH*

LIQUID CRYSTALS

Light-driven colour change

Adv. Mater. http://dx.doi.org/10.1002/adma.201103362 (2011)

The development of cholesteric liquid crystals that offer dynamic colour tuning of their reflection across the visible spectrum would be of great interest for many applications in imaging, display technology and electronics. Unfortunately, this task has so far required the use of three distinct liquid crystal films, each serving the red, green or blue regions separately and being switched on or off electronically. In contrast, using light as a means of tuning reflectivity is attractive because it offers remote, spatial and temporal control. So far, however, reports of such light-driven colour changes are dynamic and continuous; that is, the material remains a particular colour only for as long as the controlling light is incident on it. Quan Li and co-workers at Kent State University in the USA have now synthesized two light-driven chiral molecular switches with very high helical twisting powers that quickly and reversibly modulate their structural reflection from blue to red, via green, when irradiated with light of ultraviolet or visible wavelengths. Such wavelength-selective reflection provides a simple and easy way of simultaneously achieving red, green and blue reflection colours in a single light-driven self-organized thin film. The researchers say that this work will encourage the development of light-driven chiral molecular switches or motors for a range of practical applications. *JB*

SEMICONDUCTOR LASERS

Green power boost

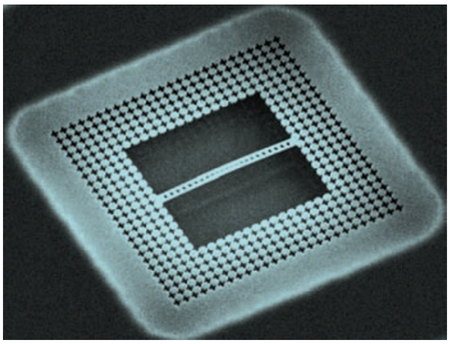
Appl. Phys. Express **4,** 102103 (2011)

Efficient electrically driven green semiconductor lasers are in strong demand for applications such as full-colour laser projectors and displays. Attention has been particularly focused on GaN-based devices grown on *c*-plane substrates, which have so far provided the highest wall-plug efficiencies. Scientists from US firm Corning have now shown that a GaN laser grown on a semipolar plane substrate is an attractive alternative that provides continuous-wave output powers of up to 60 mW at 10 °C and 35 mW at 60 °C for a drive current of 350 mA, without any signs of roll off. This study also demonstrates that semipolar devices offer the benefits of a reasonable injection efficiency and a temperature-independent slope efficiency. In addition, this device does not seem to require the electron blocking layer often employed in *c*-plane devices. The disadvantage, however, is that the reported emission wavelength range of Corning's latest devices is 508–522nm — still slightly lower than that ideally needed for display applications, which desire a wavelength as close to 535 nm as possible. *OG*

OPTOMECHANICS

Ultimate cooling

Nature **478,** 89–92 (2011)



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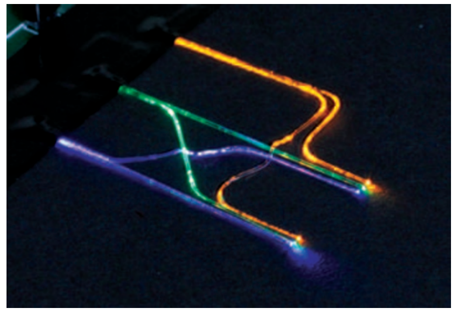
The field of optomechanics, in which light is used to influence the behaviour of miniature mechanical devices, has taken a significant step forward with the recent news that researchers have successfully laser-cooled a nanomechanical oscillator to its quantum ground state. Although physicists are keen to explore the quantum behaviour of a mechanical oscillator, the effects are hidden from view at normal temperatures and can only be accessed at very low temperatures, which are difficult to reach. A team from Caltech in the USA and the University of Vienna in Austria have now used photonics to reach the quantum regime in an experiment that operates at an environmental temperature of 20 K — around 1,000 times higher than previous experiments. Jasper Chan and colleagues fabricated a silicon nanobeam cavity and placed it into a helium cryostat at a temperature of 20 K. They then fed light from a tunable laser into the nanobeam via a tapered fibre nanoprobe. By tuning the laser wavelength to a slightly longer frequency than the resonance of the nanobeam optical cavity, the light can be used to perform optically induced damping of the mechanical motion, thereby cooling the oscillator to its quantum ground state. The researchers say that experiments for preparing and measuring the non-classical quantum states of the mechanical system are now within reach. *OG*

WAVEGUIDES

Liquid flexibility

Adv. Mater. http://dx.doi.org/10.1002/adma.201102411 (2011)



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Integrated optical systems require waveguides that are able to channel light along defined pathways with minimal loss and negligible crosstalk. Traditional techniques for fabricating channel waveguides, such as soft lithography, direct lithographic patterning or photoresist-templated etching, are limited to in-plane configurations or require repeated developing or etching steps to produce multiple layers of waveguides. Jennifer Lewis and co-workers in the USA have now developed a technique for fabricating optical waveguides in arbitrary planar and non-planar configurations through a technique called photocurable liquid core–fugitive shell printing. The researchers first encapsulate a hybrid organic–inorganic fluid within a viscoelastic ink shell made from an aqueous triblock copolymer solution, which acts as a sacrificial support for the core fluid. They then print the core fluid and viscoelastic fugitive ink shell simultaneously while curing the waveguide using an ultraviolet LED. The intensity of the ultraviolet light can be varied in the range of 1–19 mW cm^{-2}, with a higher curing intensity leading to lower optical loss. Waveguides printed through this technique exhibit low optical loss throughout the visible spectrum. The researchers say that this approach offers a flexible way of producing waveguide networks for integration with high-bandwidth next-generation optical systems and optical sensor arrays. *JB*

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