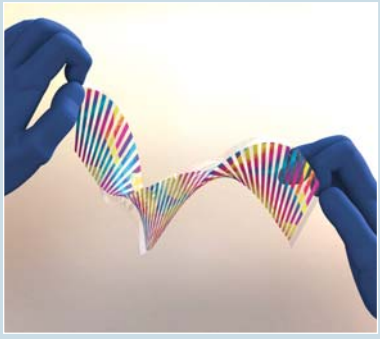
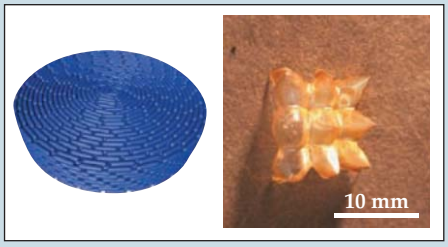


the optical power in the process of color splitting. The key is a regular array of high- and low-optical-index materials. The initial experiments are with lithographically produced silicon bars about 120 nm tall, spaced according to the desired wavelength of light, and embedded in a flexible layer of silicone. The Berkeley group's calculations show that such a high-contrast metastructure (HCM) is capable of enhancing any one of the many diffraction orders at the expense of the rest. What's more, the resulting anomalous reflection (or refraction) of the HCM is highly efficient, collecting more than 80% of the desired color's power from the incident white light. The team's final twist, as shown here, is that small bends and stretches of the HCM can change the colors in a predictable way by altering the spacing of the high-index nanostructures. Chang-Hasnain and company envision applications that include display technologies, active camouflage, and sensors. (L. Zhu et al., *Optica* **2**, 255, 2015.) —SGB

Glaciers melt noisily into the sea. When a glacier meets the sea, vast chunks of ice can split from its terminus and crash into the water below. Those spectacular events are not the only source of glacial sound. Even when glacial ice merely melts on contact with seawater, millimeter-sized pores of pressurized air that are trapped in the ice wriggle noisily free to form bubbles that float to the surface. Erin Pettit of the University of Alaska Fairbanks and her collaborators have measured, both in the field and in the lab, the noise made by the escaping air. Their finding: Melting ice is the predominant source of ambient noise in glacial fjords. To reach that conclusion, Pettit's team first set up hydrophones in three glacial fjords: Icy Bay and Yakutat Bay in Alaska and Andvord Bay in Antarctica. They found that the time-averaged acoustic spectrum in all three locations featured a broad peak between 1 kHz and 3 kHz. To confirm that the pores are responsible for the peak, the researchers retrieved blocks of ice from the terminus of Alaska's Gulkana Glacier and shipped them to the lab of their collaborator Preston Wilson at the University of Texas at Austin. There, they floated cubes of the ice in cold water and monitored the sound as the cubes melted. As in the field study, the acoustic spectrum peaked at 1–3 kHz. Having measured the pores' acoustic spectrum and correlated it with the properties of melting ice, Pettit and her collaborators have identified a cheap, safe, and convenient means to monitor glacial melt. (E. C. Pettit et al., *Geophys. Res. Lett.*, in press.) —CD

A pop-up rubbery material that can unpop. A substance that stores flat, transforms into a three-dimensional shape on demand, and reverts to flatness once the job is done could improve the portability of myriad devices and might even find applications as biomedical implants. Now Timothy J. White (Air Force Research Laboratory) and colleagues have created such a material by carefully patterning thin liquid-crystal domains into a rubber called a liquid-crystal elastomer (LCE). Although liquid crystals flow like a liquid, their molecules are aligned. And when heated, illuminated, or exposed to electromagnetic fields, the crystals' molecular order can be disrupted, which causes the crystals to contract along that alignment direction. The left figure is a schematic representation of a 3-mm-diameter pattern induced by White and colleagues in one of their experiments. As illustrated, liquid-crystal monomers line up end to end in concentric circles. Once patterned, the monomers are polymerized. When heated, the circular polymer chains contract along their alignment axes; to conserve volume, the LCE expands radially. With their circumferences decreasing and radii increasing, the liquid-crystal circles can't remain in a plane: The LCE pops into the third dimension and assumes a conical shape. The right figure shows an example of an LCE created with nine circular patterns. When cooled, the process reverses and the LCE once again becomes flat. (T. H. Ware et al., *Science* **347**, 982, 2015.) —SKB



Nanobubbles distinguish themselves from impostors. A close-up look at a surface under water might reveal squat bubbles hundreds of nanometers in diameter and a few tens of nanometers tall. The surface nanobubbles could be useful for reducing drag in microfluidic devices. But they have puzzled researchers because their longevity defies conventional wisdom: They can survive for days even though they should only last for microseconds, given the high internal gas pressure implied by their small size. The usual way to image them is with atomic force microscopy, which can easily mistake common contaminants, such as polymer droplets, for nanobubbles. That ambiguity and conflicting results from spectroscopic studies have led some researchers to question the existence of the diminutive bubbles. Now researchers at Nanyang Technological University in Singapore, led by Claus-Dieter Ohl, have conclusively identified nanobubbles. Using a total-internal-reflection fluorescence microscope and a high-speed camera operating at 2000 frames per second, they watched suspected nanobubbles in a microchannel as air was pushed through the channel to displace the water. The snapshots here show a water-air-substrate boundary moving right to left through nanobubbles. Unlike polymer droplets or solid particles, the nanobubbles collapsed just as expected when the moving boundary touched them. The researchers found that molecular kinetic theory does a far better job of describing the collapse than bulk hydrodynamics. With that observation in mind, the group is working on a new microscopic model they hope will help answer why nanobubbles live so long. (C. U. Chan et al., *Phys. Rev. Lett.* **114**, 114505, 2015.) —SC ■