VISCOSITY OF TWO-DIMENSIONAL SUSPENSIONS is similar to that in three dimensions. Many technologically and biologically important interfaces are actually monolayers composed of two coexisting phases: solidlike crystals of the molecules floating in a sea of liquidlike molecules. Researchers at the University of California, Santa Barbara, measured the viscous drag on a magnetic needle in monolayers of human lung surfactant lipids. They found that if the relative fraction of the layer's area that contained crystals was low, the viscosity was also low and the monolayer spread easily. As the crystals' coverage increased, so did the viscosity until, at a critical fraction of the total area, the monolayer abruptly became rigid. Moreover, the behavior held for a wide range of surface pressures, temperatures, and monolayer compositions and was the same as that for a 3D dispersion of hard spheres in a solvent with long-range repulsive interactions. The scientists believe their work could lead to better replacement surfactants—for example, for premature infants with respiratory distress syndrome. Human lung surfactant has an important role in replacing the blood's carbon dioxide with oxygen. It helps keep the lungs' tiny air sacs properly inflated by controlling their surface tension. (J. Ding et al., *Phys. Rev. Lett.* **88**, 168102, 2002.) —BPS

A TABLETOP NEUTRON SOURCE is being used to calibrate a dark-matter detector. Expected to be the dominant type of matter in the universe, dark matter interacts only very weakly with normal matter. Like a neutrino detector, a dark-matter detector will succeed only if it has enough target atoms with enough mass, operates over an adequately long period, and has sufficient background suppression. In one prototype detector using both liquid and gaseous xenon, an incoming weakly interacting massive particle (WIMP) would strike a Xe nucleus and produce both scintillation light and free electrons from ionized Xe atoms, a process strikingly similar to elastic neutron–Xe interactions. Therefore, to calibrate the detector, physicists at Imperial College, London, aimed neutrons into the Xe bath using an inexpensive and compact plasma focus discharge device as a neutron source. Deuterium fusion reactions in a pinched plasma produced helium-3 nuclei plus forward-directed 2.45-MeV neutrons. The tabletop neutron source (a pulsed device that delivers about 20 million neutrons per shot) might also be handy for the detection of nitrogen-based explosives or in the transmutation of nuclear waste. (F. N. Beg et al., *Appl. Phys. Lett.* **80**, 3009, 2002.) —PFS

NANOTUBES BOOST EPOXY PROPERTIES. Researchers routinely add carbon fibers to epoxies and other polymers to produce strong, tough, high-performance materials. Carbon nanotubes (CNTs) are even stronger than carbon fibers, but when they were first added to polymers a few years ago, the expected gains in strength didn't show up. Poor bonding between the CNTs and the polymer was suspected. Having discovered in 2000 that CNTs are tremendous heat conductors, the University of Pennsylvania's A. T. "Charlie" Johnson and his collaborators sought, by incorporating CNTs, to boost epoxy's thermal conductivity, which they reasoned wouldn't be as sensitive as mechanical strength to the bonding. To their surprise, the CNT-enhanced sample was not only a better thermal conductor, but was also significantly stronger. Johnson doesn't know exactly why his samples are so strong. One reason might lie in the method his team used to thoroughly disperse the CNTs in the epoxy. If that's the case, poor CNT dispersal, rather than weak CNT–polymer bonding, could have frustrated previous attempts to boost mechanical strength. CNT-enhanced epoxies or polymers could end up conducting heat away from high-performance integrated circuits. (M. J. Biercuk et al., *Appl. Phys. Lett.* **80**, 2767, 2002.) —CD

ONE- AND TWO-PHOTON INDUCED FLUORESCENCE for DNA sequencing. One common method of sequencing DNA is to have a free-floating short strand of DNA with a known sequence of bases—called an oligonucleotide—find its complementary sequence on the full strand. If the oligonucleotide also has a fluorescent dye attached, researchers can then easily locate that sequence in the main DNA. As many as four dyed oligonucleotides have been used at once to speed the sequencing, but the dyes' broad emission peaks can overlap and confuse identification of the short strands. Now, Chieu Tran and Troy Alexander at Marquette University in Milwaukee have come up with a novel approach: They tagged two oligonucleotides with special dyes that absorb the same wavelength of light very differently. One of the dyes conventionally absorbs one photon and emits another slightly redshifted one. The other dye is activated only when two photons are absorbed at once, a low-probability event; it then emits a greatly blue-shifted photon. Eschewing the high-intensity pulsed laser that is generally needed for two-photon fluorescence, the researchers showed that a continuous-wave laser and an acousto-optic tunable filter can do the job. Using a single wavelength of exciting light, they successfully detected the fluorescence, separated by 200 nm, of two different oligonucleotides in a single sample. Tran expects to develop another similar pair of dyes to increase the multiplexing capability of their scheme. (T. Alexander, C. D. Tran, *Appl. Opt.* **41**, 2285, 2002.) —SGB