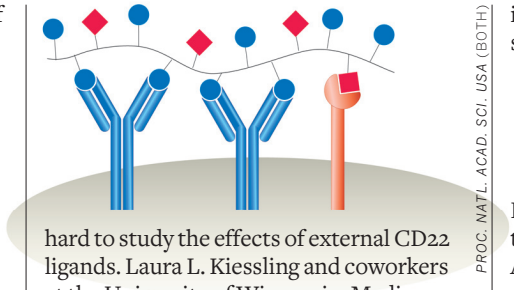
catalysts that hydrothiolate a broad range of alkyl, aryl, and vinyl alkynes with aliphatic, aromatic, and benzylic thiols. For example, 1-pentanethiol and 1-hexyne react via Markovnikov addition to form the corresponding vinyl sulfide with a yield and selectivity of roughly 100%. The team is now investigating the reaction mechanism to uncover the basis of the high regioselectivity.—MJ

THINNER PLASTIC BLOCKS GAS BETTER

Plastic packaging can't be used for bottling products such as beer because it's permeable to oxygen and carbon dioxide. Although these gas molecules are blocked by crystalline regions in plastic film, they readily slip through amorphous zones between the crystalline regions. Researchers now report the counterintuitive finding that making a plastic film super-thin reduces its permeability to oxygen by two orders of magnitude. Anne Hiltner of Case Western Reserve University, in Cleveland, and colleagues coextruded poly(ethylene oxide) and poly(ethylene-*co*-acrylic acid). The researchers passed the assembly through a series of dies that split and spread the combined layers. The layers were then stacked on others and the process was repeated to create films with thousands of ever-thinner layers. When the researchers tested the performance of the resulting films, they were startled to find that oxygen and carbon dioxide permeability fell as the polymer layers became thinner. They discovered that when poly(ethylene oxide) is confined to layers just 20-nm thick, it forms large ordered regions that resemble giant single crystals (*Science* **2009**, *323*, 757).—SLR

IMMUNITY MECHANISM REVEALED

Researchers have discovered the role played by a key immune-cell coreceptor. CD22 (orange) is a coreceptor to B-cell receptors (BCRs, blue) on the surface of antibody-generating B-cells. CD22 is known to prevent immune responses. But its mechanism of action has been blocked from scientists' view because it binds to immunogenic glycoproteins with sialic acid groups, both from the surrounding medium and on its own cell surface. The cell-surface interactions tie up CD22's binding site, making it



PROC. NATL. ACAD. SCI. USA (BOTH)

hard to study the effects of external CD22 ligands. Laura L. Kiessling and coworkers at the University of Wisconsin, Madison, have now used antigenic polymers bearing both BCR and CD22 ligands (blue circles and red squares) to promote binding of external CD22 ligands (*Proc. Natl. Acad. Sci. USA*, DOI: 10.1073/pnas.0807207106). They find that immunogenic ligands that bind CD22 inhibit immune activation—showing that the presence of sialic acid residues on antigens can suppress the immune response. The work could lead to new strategies to prevent autoimmune conditions like multiple sclerosis.—SB

PRINTER PARTICLES FORM IN AIR

Laser printers can be a significant source of ultrafine particles, generating levels in some offices equal to those of busy roadways (*C&EN Online*, Latest News, Aug. 1, 2007). Inhaling such particles can lead to respiratory problems. A new study now elucidates the chemical composition of airborne, printer-related particles and the mechanisms by which they form. Lidia Morawska of Queensland University of Technology, in Brisbane, Australia, and colleagues demonstrated in lab studies that the particles are not emitted directly from the printers. Rather, the particles form in the air from volatile organic compounds originating from the paper and hot toner (*Environ. Sci. Technol.*, DOI: 10.1021/es802193n). Particles form via either spontaneous homogenous nucleation or secondary particle formation involving ozone that is created during the printing process, Morawska explains. Analysis of particles showed mostly organic components, ranging from ethylbenzene to decanes. The particles also contain inorganics such as iron, from iron oxide in the toner, and calcium, traced to a calcium carbonate coating on the paper. The findings may help the printer industry reduce printer emissions, the researchers suggest.—RAP

OCEAN ACIDITY AFFECTS FISH SENSES

Here's another worry for Nemo's father, the Pixar-Disney animated clownfish. Acidic ocean conditions can disrupt orange clownfish larvae's ability to distinguish and respond to olfactory cues that help them locate a suitable adult habitat in a coral reef, according to a new study (*Proc. Nat. Acad. Sci. USA*, DOI: 10.1073/pnas.0809996106). High levels of human-generated carbon dioxide are the main reason that oceans are acidifying. Global pH of surface-ocean waters is currently about 8.1 and is expected to drop by approximately 0.3 units in the next 50–100 years. Scientists recognize that ocean acidification threatens marine ecosystems, but few studies have examined effects on fish. Philip L. Munday of James Cook University, in Australia, and colleagues raised clownfish (*Amphiprion percula*) in seawater acidified with CO_2. At pH 7.8, a condition that could arise around 2100 if the oceans continue to absorb CO_2 at the current rate, the fish lost the ability to distinguish between chemical cues that might help them locate a proper habitat. At pH 7.6, the fish didn't respond to any environmental cues. If the pH drop is widespread, it could threaten the survival of a broad range of marine species, Munday says. More studies are needed to see whether the effect is reversible.—RAP

Acidic seawater affects the clownfish's homing abilities.