**STRETCHING ALTERS MOLECULAR MAGNETICS**

The mechanical stretching of a single cobalt complex tethered between two gold electrodes alters the molecule’s magnetic states, changing the processes by which electrons flow through the system (Science 2010, 328, 1370). This strategy, developed by physics professor Daniel C. Ralph and postdoc Joshua J. Parks of Cornell University, and their colleagues, not only gives scientists an ideal tool for investigating subtle details of molecular magnetism but could also provide a way to control molecular spin states for applications such as information storage. The group connected an octahedrally symmetric cobalt complex to two gold electrodes. In its normal state, the complex has a cubic shape. They then stretched the complex, distorting it into a tetragon. When the molecule’s symmetry is broken, formerly degenerate spin states separate into discrete levels, which can be observed in spectral lines. This new level of mechanical control over the spin states allowed the group to study a complex, spin-dependent phenomenon known as the Kondo effect, in which the molecule interacts with neighboring conduction electrons.—EKW

**ULTRASENSITIVE CRYSTAL PROBE**

A novel laser-based method can detect nucleation and onset of crystallization of chiral compounds up to 100 million times more sensitively than conventional detection methods, according to researchers at Purdue University who developed the technique (Anal. Chem., DOI: 10.1021/ac100564f). The procedure provides an exceptionally sensitive way to probe nucleation and growth kinetics at the earliest stages of crystal formation. In addition, the technique may be useful for studying pharmaceutical agents, which often need to be inhibited from crystallizing to avoid reducing their bioavailability (C&EN, May 31, page 13). Purdue’s Duangporn Wanapun, Garth J. Simpson, Lynne S. Taylor, and coworkers melted samples of griseofulvin and chlorpropamide (antifungal and diabetes drugs, respectively) and then cooled the melts while probing them for crystal formation with their newly developed nonlinear optical imaging method. The method’s detection limit, roughly 1 part in 10 billion by volume, enabled the group to observe crystals with dimensions as small as 150 nm, they report. That limit is lower by a factor of 10^6 compared with common spectroscopy and diffraction methods and represents a five-order-of-magnitude improvement relative to optical microscopy.—MJ

**BRAIN HELPS CONTROL CHOLESTEROL**

Until now, cholesterol circulation in the blood was thought to be “exclusively regulated through dietary absorption or synthesis and secretion by the liver,” according to Matthias H. Tschöp, an endocrinologist at the University of Cincinnati College of Medicine. But Tschöp and his colleagues have found evidence that cholesterol circulation is also controlled by the brain (Nat. Neurosci., DOI: 10.1038/n.2569). The researchers studied the activity of ghrelin, a hormone produced primarily by the gut. Production of the hormone increases before meals and stimulates appetite and feeding through inhibition of the melanocortin 4 receptor in the hypothalamus region of the brain. Working with rats and mice, the team determined that boosting ghrelin levels reduces the liver’s uptake and metabolism of HDL—the “good” cholesterol—and thereby increases the amount of HDL circulating in the blood. Although they caution that rodent and human cholesterol differ, the researchers believe their findings could offer a new route for pharmacological control of cholesterol levels.—SLR

**MEMBRANE PROTEINS YIELD TO HYDROGEN EXCHANGE MS**

Hydrogen exchange mass spectrometry of membrane proteins in phospholipid bilayer nanodisks provides a controllable way to examine the conformation of membrane proteins in native-like conditions, according to a study by chemists at Boston’s Northeastern University and the University of North Carolina, Chapel Hill (Anal. Chem., DOI: 10.1021/ac100963c). Structural information is difficult to obtain for membrane proteins because they don’t crystallize easily. So John R. Engen, Kasper D. Rand, and coworkers use phospholipid bilayer nanodisks to mimic the cellular environment of membrane proteins. They expose a nanodisk loaded with a membrane protein to deuterated water for defined lengths of time. After quenching the reaction, they use MS of the digested proteins to determine where deuterium was incorporated. Using the 94-kilodalton γ-glutamyl carboxylase as an example, they observed deuterium incorporation in 71 peptides, indicating that these parts of the membrane protein are accessible to solvent. The work “should provide incentive for many to use the same approach to solve interesting questions about membrane protein structure and topology in bilayer structures,” says Stephen G. Sligar of the University of Illinois, Urbana-Champaign, who invented the nanodisks.—CHA