JACS
JOURNAL OF THE AMERICAN CHEMICAL SOCIETY

Spotlights

pubs.acs.org/JACS

Spotlights on Recent *JACS* Publications

PRESSURED PROTEINS SHOW THEIR MOVES

Nuclear magnetic resonance spectroscopy (NMR) can give structural and dynamical information about the behavior of individual components of proteins in solution, but traditionally the method does not provide information about their interdependence. By applying pressure during an NMR experiment, A. Joshua Wand and colleagues demonstrate it is possible to monitor coupling of motions between protein side chains (DOI: 10.1021/ja3004655).

Pressure NMR can tease out higher-energy protein conformations that are present but not readily observed under ambient pressure. These motionally activated protein molecules carry significant conformational entropy that may determine protein interactions. The researchers studied ubiquitin and found that methyl groups from various sections of the protein move differently, as though to their own local "beat". Surprisingly, the wobbly protein conformations outnumbered the rigid states under physiological conditions. This finding suggests that low-temperature crystal structures may not entirely represent what proteins really look like in the body, which has implication for the development of therapeutic drugs.

Drug makers seek compounds that interact with and modulate disease-linked proteins, but this goal is a challenge because scientists have not entirely figured out what forces bring proteins and small molecules together. A source of this problem may be that pharmaceutical companies largely rely on static protein crystal structures for drug development. Meanwhile, researchers continue to find evidence that the movements of proteins are critical to understanding the energetics of ligand binding by proteins. **Erika Gebel, Ph.D.**

CONTROLLING SILICON HANDEDNESS FOR APPLICATIONS IN ORGANIC ELECTRONICS

The chirality of a silicon center is more difficult to control in reactions than that of a carbon center. Additionally, a limited number of synthetic strategies exist for selectively constructing silicon stereocenters, a detriment to exploring the applications of optically active silicon compounds like dibenzosiloles. Researchers led by Ryo Shintani have developed a new method to synthesize dibenzosiloles with enantioselectivity at the silicon center (DOI: 10.1021/ja302278s).

Dibenzosiloles are a class of compounds that could be used in optoelectronic devices such as light-emitting diodes, detectors, solar cells, and thin-film transistors. But the potential utility of dibenzosiloles in these types of devices may be expanded by developing a new synthetic method for enantiomerically enriched dibenzosiloles. Shintani and coworkers used a palladium catalyst to perform an intramolecular C−H bond ring-closing reaction on a carefully designed precursor. The reaction produces only one version of the chiral dibenzosiloles in high yield.

Now that the group has developed the first efficient route to these optically active dibenzosiloles, researchers can expand the scope of the reaction. Better synthesis methods will enable further explorations of the applications of dibenzosiloles in optoelectronic devices. **Yun Xie, Ph.D.**

FIRST-TIME OBSERVATION OF QUASICRYSTALLINE MORPHOLOGY IN TETRABLOCK TERPOLYMER

For the first time, scientists have observed a quasicrystalline morphology in an undiluted multiblock polymer. Block polymers are a diverse family of molecules that consist of repeating monomer units known as blocks. By tailoring the composition of the blocks, scientists can create complex nanostructures with specified shapes that give them useful mechanical, optical, and electronic properties.

Frank S. Bates and Jingwen Zhang synthesized and characterized a tetrablock terpolymer, which is made of four blocks using three different monomers (DOI: 10.1021/ja301770v). The material has a dodecagonal quasicrystalline morphology, which has never been reported before in pure block polymers.

Quasicrystals are materials that have rotational symmetry but lack the long-range translational order that is seen in crystal solids. These unique properties give quasicrystals the potential to exhibit packing geometries with unconventional crystalline orders that are not feasible with traditional crystals. This work opens the door to further experimental and theoretical investigations of quasicrystalline multiblock polymers, and to applications of soft materials with new states of order. **Christine Herman, Ph.D.**

Published: May 3, 2012

dx.doi.org/10.1021/ja304193j | *J. Am. Chem. Soc.* 2012, 134, 8001−8001