JOURNAL OF THE AMERICAN CHEMICAL SOCIETY

Spotlights

pubs.acs.org/JACS

Spotlights on Recent *JACS* Publications

TUNABLE NANOSPHERES BASED ON POLYMER/METAL ION RATIO

Nanospheres formed by supramolecular self-assembly are of great interest to chemists for encapsulating functional molecules for later delivery. The nanospheres can be used in a variety of technologies, such as drug-delivery, cosmetics, and nanoreactors. There are multiple examples of these types of nanospherical assemblies with an assortment of different polymers. Adding to these examples, Ricardo Riguera and co-workers report the self-assembly of nanospheres with optically active poly(phenylacetylene)s and divalent metal ions (DOI: 10.1021/ja3061112).

These helical polymer−metal complex nanospheres are made up of metal ions such as calcium or barium and α-methoxyphenylacetic acid. By changing the polymer-to-metal ion ratio, the researchers can select the size of the nanosphere. In addition, variation of the metal ion can change the helicity on both the surface and the interior of the nanosphere. As a result, a number of different molecules can be encapsulated inside, including iron oxide magnetic particles, quantum dots, and fluorescent dyes. The ability to tune the size of these chiral nanoparticles and trap target molecules within adds to the understanding of how self-assembled materials work, which may lead to more specific advanced technologies in the future. **Leigh Krietsch Boerner, Ph.D.**

A GROWTH FACTOR IS ESSENTIAL IN FORMATION OF SEA URCHIN'S ENDOSKELETON

Synthesis of the single-crystalline endoskeleton of the sea urchin starts with the deposition of triradiate spicules. Three spikes are deposited by primary mesemchyme cells (PMCs) and are joined in the form of a star, just like the blades of a wind turbine. Recently researchers found that a growth factor belonging to the vascular endothelial growth factor (VEGF) protein family switches on the production of the spicules and controls the shape of the crystals.

Sea urchin PMCs can be cultured in vitro, and Derk Joester and co-workers report the identification of a specific member of the VEGF protein family as the growth factor that regulates the shape of the spicules (DOI 10.1021/ja309024b). In a series of experiments they found that the number and shape of the formed spicules, which can vary from linear to tridentate to H-shaped structures, depend critically on the concentration of the growth factor sensed by PMCs.

Understanding how PMCs sense and use information from the growth factor in spicule formation may be relevant to an improved understanding of directional, single-crystal formation in a range of biological systems. **Alexander Hellemans**

ENZYME COLLABORATION FOR THE SYNTHESIS OF COMPLEX BIOMOLECULES

Many fungi make biomolecules called polyketides, which have diverse biological and medicinal properties. Examples include the blockbuster cholesterol-lowering drug lovastatin and common crop toxins called aflatoxins. Large enzyme complexes inside the fungi, called iterative polyketide synthases (IPKSs), are responsible for assembling such compounds, and multiple IPKSs can work together to produce increasingly intricate polyketide structures.

Toward increasing our understanding of these remarkable enzymatic conglomerates, Yi Tang, Kenji Watanabe, and co-workers elucidate how IPKSs from the fungus *Chaetomium globosum* collaborate to create compounds from two distinct classes of the azaphilone family of polyketides, the chaetomugilins and the chaetoviridins (DOI: 10.1021/ja3090498). They use various genetic and molecular biology techniques to identify the specific genes in the fungus that partner to make these compounds. In addition, they demonstrate that the IPKSs cooperate at a previously underappreciated level to enhance the complexity and diversity of their products. These findings elevate our understanding of how IPKSs manufacture such varied polyketide products, and will contribute to our increasing ability to manipulate polyketide synthases to create molecules with novel and improved biological activities. **Eva J. Gordon, Ph.D.**

TURNING THE LIGHTS ON TO DESIGN PLASMONIC POLYMERS

Plasmonic nanostructures, made of well-defined arrangements of metal nanoparticles (NPs), have potential for applications in sensing, nanoscale light transport, and optical nanocircuits. Linear chains of metal NPs can be considered as plasmonic polymers, given they can be made to have optimal structural properties that yield the desired optical properties.

Researchers led by Eugenia Kumacheva have developed a new strategy that uses light to control the structural properties of gold nanorod chains (DOI: 10.1021/ja309475e). The team tailored the ends of the nanorods to present a ligand, poly(styrene-*co*-isoprene), that promotes the self-assembly of nanorods into linear chains under certain solvent conditions. They then photo-cross-linked the ligands by exposing the self-assembled nanorod chains to light. They found photo-irradiation arrests the self-assembly process, allowing researchers to tune the degree of polymerization of plasmonic polymers. Light exposure also increases the rigidity of the nanorod chains and reduces the distance between neighboring nanorods in a time-dependent manner. The study demonstrates the technique's potential for developing plasmonic polymers for optoelectronics and sensing applications. **Christine Herman, Ph.D.**

Published: November 19, 2012

© 2012 American Chemical Society

dx.doi.org/10.1021/ja311109x | *J. Am. Chem. Soc.* 2012, 134, 19309−19309