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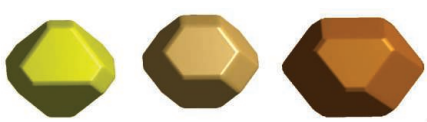
neurons are bound into such functional groups. Bähner *et al.* combined electrophysiological recordings in brain slices with computer modeling to describe a cellular mechanism that may underlie assembly formation in hippocampal networks. By focusing on complexes involved in memory consolidation, they found that pyramidal cells formed two clearly distinct functional groups with respect to their participation in such complexes. Participating pyramidal cells had peculiar properties: They generated antidromic axonal action potentials that were facilitated by axonal $GABA_A$ receptors. Classical perisomatic GABAergic inhibition, in contrast, suppressed background activity and ensured that nonparticipating neurons were silenced during these periods. These results provide a mechanism of assembly formation in oscillating networks. — PRS

Proc. Natl. Acad. Sci. U.S.A. **108**, 10.1073/pnas.1103546108 (2011).

MATERIALS SCIENCE

The Shape of Things to Come

The Wulff construction uses thermodynamic arguments to predict the equilibrium shape of a crystal based on knowledge of the surface energies of the crystal faces. For single-component systems, the thermodynamic shape proves to be independent of the crystal size unless the crystal is highly strained. For an alloy system, where there is an additional degree of freedom due to the possibility of one of the species segregating to the surface, the size invariance of the thermodynamic shape is lost, and the infinite reservoir approximation used in the Wulff construction no longer holds true. Ringe *et al.* developed a modified Wulff construction for



alloy systems to account for concentration gradients. The behavior of a particular system was shown to depend on the alloy strength, which is determined by the difference between the actual bulk free energy and a linear interpolation of the idealized values. For weak alloys, there is a strong segregation of one of the components, and the thermodynamic shape of the crystal is similar to that determined from a basic Wulff construction. For strong alloys, which include many bimetallic catalysts such as CuAu and AuPd, there is a competition between lowering the surface energy and the bulk energy, with segregation to the surface a significant factor for the smallest particles. The limited experimental data in the literature confirm the general trends seen by the authors. — MSL

Nano Lett. **11**, 10.1021/nl2018146 (2011).

CREDIT: RINGE *ET AL.*, *NANO LETT.* **11**, 10.1021/NL2018146 (2011)

GENETICS

Better Annotation Needed

In genomic studies, annotation of previously sequenced organisms provides an important starting reference point. These annotated genomes are often used for bioinformatic searches to determine the composition of the environmental microbiota, generated through the analyses of fragmented genomic sequences. Database errors, however, can negatively affect such analyses and/or produce misleading results. Tripp *et al.* analyzed sequencing results from a set of oceanic samples and human microbiome reference bacteria and found that misannotations of ribosomal RNA (rRNA) sequences were prevalent and are propagated, despite corrections. Given that sequences coding for rRNAs are often found in these samples and are used to determine their phylogenetic placement, such widespread errors suggest underlying problems in annotation. Furthermore, these errors can significantly bias analyses and be time-consuming to detect. On the basis of these results, the authors call for increased vigilance on the part of researchers and database curators to properly identify and annotate rRNAs. — LMZ

Nucleic Acids Res. **39**, 10.1093/nar/gkr576 (2011).

MATERIALS SCIENCE

Featured Ferroelectrics

Ferroelectric thin films can exhibit not only directional switching of polarization but also pyroelectric or piezoelectric effects that can be useful in micro- or nanoelectromechanical devices. However, unlike materials such as silicon, which can be readily patterned through techniques developed from chip manufacturing, the various methods for ferroelectric patterning of thin films often have limitations. Kim *et al.* describe a method that allows arbitrary patterning of ferroelectric films on any substrate, so long as it is undamaged by brief exposures to temperatures of 250° to 300°C. Thin films of sol-gel precursors for ferroelectrics such as lead zirconium titanate or lead titanate, on substrates such as silicon, glass, and polyimide tape, were heated for 1 min to these temperatures to remove organic molecules. Actual pattering is achieved with an atomic force microscope tip heated above ~550°C. Feature sizes run tens of nanometers in width and several micrometers in length. — PDS

Adv. Mater. **23**, 10.1002/adma.201101991 (2011).