

Nanomechanics of microtubulesA. Kis *et al.**Phys. Rev. Lett.*, 2002, **89**, 248101–1.4

Microtubules, the filamentous assembly of alpha- and beta-tubulin subunits, are the building blocks for molecular motors. The mechanical anisotropy of a single microtubule is measured by electron-beam lithography with a tip of an atomic force microscope. The bending stiffness of the microtubule exhibits a strong temperature dependence. A length-dependent flexural rigidity of microtubules is also observed.

Control of a biomolecular motor-powered nanodevice with an engineered chemical switchH. Liu *et al.**Nature Mater.*, 2002, **1**, 173–177

Fluorescent actin filaments are attached to the motor protein subunits in a tethering assay for the rotation of wild-type and mutated motors. The cytoplasmic fragment of F1-ATPase is a model for the ATP-fuelled rotary motor. The hydrolytic activity of the wild-type and the mutant enzyme are assessed by a coupled enzyme assay. The successful engineering of a zinc-dependent reversible modulation of the rotation will be useful for nanodevices and nano-composites.

Magnetic field-induced spontaneous pattern formation in aerosol particle depositsH. Wolf *et al.**Europhys. Lett.*, 2002, **60**, 573–579

A self-regulating formation of nanoparticle chains is observed in the practice of a homogeneous magnetic field. Iron pentacarbonyl is evaporated in the flow of argon gas. Magnetic iron nanocrystals, made from the decomposition of the aerosol, are approximately 10 nm in diameter. At a critical size of the chain, spontaneous formation of regular pattern is observed. A mathematical formulation analysing stability of the patterns is presented.

Fractal patterns in binary semiconductors by electrochemical deposition

K. K. Nanda and S. N. Sahu

Europhys. Lett., 2002, **60**, 397–403

Formation of branched fractal patterns is investigated with a constant current with parallel electrodes of binary semiconductors (PbS, CdSe), by electrochemical deposition in an aqueous electrolytic bath. Clear fractals are observed for CdSe and fractals with scattered grains are observed for PbS. The pattern of the fractals depends on the concentration and current density, lower current density favouring growth of scattered grains.

On the conservation of fast calcium wave speeds

L. F. Jaffe

Cell Calcium, 2002, **32**, 217–229

Ten $\mu\text{m/s}$ velocity calcium waves have been known in diverse activating eggs. Fast calcium waves, propagating at a velocity of 30 $\mu\text{m/s}$, are known in many 'fully active systems'. An update of calcium waves and first calcium waves is presented in this compilation from algae and other diverse genera like sponges, blowflies, squid and human. In all cases, the velocity varies as the square root of speed of reaction and diffusion constant of free calcium.

Shape-controlled synthesis of gold and silver nanoparticles

Y. Sun and Y. Xia

Science, 2002, **298**, 2176–2179

Technologically desirable, important properties of nanoparticles are often regulated by the size and shape of the particle. Monodisperse silver nanoparticles are synthesized by reduction of silver nitrate. The morphology and dimensions of the single-crystalline nanoparticles depend on reaction conditions and reaction mixtures. The silver nanocubes can serve as a template to generate single-crystalline nanoboxes of gold, by displacing gold with silver in an aqueous solution of HAuCl_4 .

DNA nanoparticles and development of DNA delivery vehicles for gene therapyV. Vijayanathan *et al.**Biochemistry*, 2002, **41**, 14085–14094

A non-viral vehicle for delivering DNA

for gene therapy has been developed using nanotechnology. This involves use of condensing agents like spermidine, spermine and several polymers that are capable of condensing desirable DNA into nanoparticles of 20–100 nm that could be transported inside the cell by endocytosis upon interaction with the anionic proteoglycans at the cell surface.

Nanostructured cellular networksP. Mariarty *et al.**Phys. Rev. Lett.*, 2002, **89**, 24

Thiol-passivated Au nanocrystals dispersed in organic solvent are spin-coated onto a native-oxide covered silicon. It is shown that nanocrystals on silicon can form cellular networks 'far from statistical equilibrium'. These cellular networks are compared to other random networks ubiquitously found in nature.

Dissociation of the single-ring chaperonin GroEL by high hydrostatic pressureM. Panda *et al.**Biochemistry*, 2002, **41**, 12843–12849

Kinetics of dissociation of single-ring heptameric GroEL in the absence and presence of salts and nucleotides, and under a hydrostatic pressure up to 2.5 kbar is studied using light scattering. The dissociated monomers reassociate very slowly and follow a biphasic kinetics.

Engineering growing tissues

Eben Alsberg and David J. Mooney

Proc. Natl. Acad. Sci. USA, 2002, **99**, 12025–12030

Growth of engineered tissues is studied in mouse models in the presence of growth-stimulating factors *in vivo*. In particular, generation of bone and cartilage tissues is studied in a transplant containing chondrocytes and osteoblasts co-transplanted on hydrogels modified with peptide sequence to promote cell multiplication. New bone tissues formed new morphological structure, mass and function that resemble phases in normal long-bone growth.