Structural Colors

On page 926, Z. Y. Xie, Z. Z. Gu, and co-workers demonstrate the fabrication of structurally colored circular contact lenses from colloidal crystal templates. The structurally colored circular contact lenses display variable brilliant color under light illumination, without requiring the addition of any colorants to the hydrogel lenses, hence preventing the potential hazards from traditionally colored contact lenses.

Photodetectors

On page 936, W. Hu, L. Liao, and co-workers develop a new type of graphene/InAs nanowire (NW) vertically stacked heterojunction infrared photodetector. This device exhibits a high photoresponsivity and a high photocurrent on/off ratio. The Fermi level of graphene can be widely tuned by the gate voltage due to its 2D nature. As a result, the back-gated bias can modulate the Schottky barrier at the interface between the graphene and InAs NWs, thus further controlling photocarrier transport across the vertically stacked heterostructures.

Cell Surface Receptors

C. T. Lim and co-workers describe a rapid and sensitive bioluminescence-based microfluidic method for quantifying receptor numbers on live cells. On page 943, this integrated, lens-free optical platform allows the determination of signals from the cell surface with high sensitivity. Compared to conventional approaches, the combined use of bioluminescence and microfluidics makes it safe to use, reduces background noise, improves sensitivity, requires smaller sample volumes, and allows high-throughput sampling over thousands of cells.
Quantitative determination of ions in cells is crucial, but presents us with certain difficulties. The delivery and intracellular location of particle-based fluorophores as well as the local ion concentration determination need to be addressed, but yield the issue of cross-talk of the fluorescence read-out with pH, and spectral overlap.

Particle-Based Optical Sensing of Intracellular Ions at the Example of Calcium – What Are the Experimental Pitfalls?

Epidermal electronics with advanced capabilities in near field communications (NFC) are presented. The systems include stretchable coils and thinned NFC chips on thin, low modulus stretchable adhesives, to allow seamless, conformal contact with the skin and simultaneous capabilities for wireless interfaces to any standard, NFC-enabled smartphone, even under extreme deformation and after/during normal daily activities.

A novel ternary drug delivery system (DDS) is constructed using a photodegradable anticancer prodrug (Py-Cbl), a water-soluble pillaarene supramolecular container (WP6), and the diblock copolymer methoxy-poly(ethylene glycol)$_{114}$-block-poly(lysine hydrochloride)$_{200}$. This DDS successfully addresses three important issues: enhancement of the water solubility of the anticancer prodrug; controlled release of the anticancer drug; accurate and quantitative measurement of the drug release.
A circular structural-colored contact lens is reported, which is fabricated by replicating self-assembled colloidal photonic crystal templates. The structural-colored contact lenses not only display variable and brilliant color under light illumination, but also avoid the addition of any colorants to the hydrogel lenses and prevent the potential harm posed by traditional colored contact lenses.

A top-down approach, i.e., creating small particles by mechanical force starting from bulk materials, probably presents the most logical approach to particle size reduction and, therefore, top-down techniques are among the first to achieve small particles. A new solvent-free, amazingly simple approach is reported, suitable to achieve nanoparticles and sub-micro particles.

In this paper, graphene/InAs nanowire heterojunction near-infrared photodetectors are fabricated with a high \( I_{\text{light}}/I_{\text{dark}} \) ratio of \( 5 \times 10^2 \). The responsivity of these heterojunction near-infrared photodetectors is \(-0.5 \) A/W, which is much larger than that of graphene infrared photodetectors (\(-0.1 \) mA/W). Moreover, the back-gated voltage can control the carrier density of the detectors.

A new method of quantifying live cell surface receptor numbers by integrating bioluminescence with microfluidics and lens-free optics is presented. This significantly improves upon other methods by providing miniaturized detection modules with higher sensitivity, specificity, lower consumption of analytes, reduced assay times, and by allowing multiplex functions for high-throughput cell screening assays.

Structural Colors
Self-Assembled Coffee-Ring Colloidal Crystals for Structurally Colored Contact Lenses

Sanding
Ultrafine Sanding Paper: A Simple Tool for Creating Small Particles

Photodetectors
High-Responsivity Graphene/InAs Nanowire Heterojunction Near-Infrared Photodetectors with Distinct Photocurrent On/Off Ratios

Cell Surface Receptors
Rapid Quantification of Live Cell Receptors Using Bioluminescence in a Flow-Based Microfluidic Device
A polyethyleneimine (PEI)-coated gold nanocomplex interlaid with a pH-responsive charge-reversible chitosan-aconitic anhydride (CS-Aco) is constructed. CS-Aco hydrolyzes in lysosomes, causing nanocomposite disassembly. The released nanoparticles rupture the lysosomes and release PEI/shRNA polyplexes into the cytoplasm, where shRNA is quickly liberated due to the short chain of the PEI. The nanocomplexes efficiently deliver shABCG2 to tumors and silence ABCG2 expression, which sensitizes HepG2 cells to the drugs.

Bone marrow-derived mesenchymal stem cells are assembled with graphene flakes in solution to form graphene–cell biocomposites, which are used to pre-concentrate growth factors for chondrogenic differentiation. Graphene oxide flakes serve as effective pre-concentration platforms for the construction of tissue-engineered cartilage and suspension-based cultures.
Tetrasomes and nucleosomes assembled by NAP1 are imaged at subsecond time-scales with atomic force microscopy. Several different pathways of disassembly are found and the spontaneous transition between two rotational states of tetrasomes is confirmed by direct imaging.

A novel type of nanomedical platform, the double-walled Au nanocage/SiO₂ nanorattle, is fabricated by combining two excavation strategies—galvanic replacement and surface-protected etching. The as-prepared nanorattle is demonstrated as a sensitive SERS substrate, an effective NIR photothermal agent, and a highly efficient drug carrier with a controllable release feature. This could inspire the controlled synthesis of other complicated nanostructures and the multifunctionality of the nanorattles will find wide application.

Sensor fabrication using modified reduced graphene oxide-filled cellulose nanocrystals can solve many of the technological issues imposed on optoelectronic sensors. This transparent and human-friendly proximity sensor surpasses other sensors in faster response, high sensitivity, reproducibility, and excellent durability. Its response towards finger distance unravels its impact in the world of touch/non-touch screens.

Pt nanoparticle@3D graphene nanobox composites are successfully synthesized through an in-situ growth route by using nanozeolites as substrates at an ambient pressure. The zeolites provide the crystal surfaces and inner micropores for the in-situ growth of graphene and confined growth of Pt nanoparticles, respectively.

Imaging

Dynamics of Nucleosomal Structures Measured by High-Speed Atomic Force Microscopy

A. J. Katan, R. Vlijm, A. Lusser, C. Dekker* 976–984

Nanorattles

Double-Walled Au Nanocage/SiO₂ Nanorattles: Integrating SERS Imaging, Drug Delivery and Photothermal Therapy

F. Hu, Y. Zhang, G. Chen, C. Li, Q. Wang* 985–993

Sensors

Transparent and Flexible Cellulose Nanocrystal/Reduced Graphene Oxide Film for Proximity Sensing


Nanocomposites

In-Situ Confined Growth of Monodisperse Pt Nanoparticle@Graphene Nanobox Composites as Electrocatalytic Nanoreactors