that's missing—what's the molecule that's causing it—because we assume that it's nucleation."

Emory University professor Shuming Nie, who has worked extensively with quantum dots, lauds the potential of this system: "It's a really innovative, excellent approach to use biological systems to synthesize these semiconductor nanocrystals, [and] it shows that these nanocrystals are intrinsically compatible with biological systems." Nonetheless, he warns that the quality of such biosynthetic preparations at present "can not really compete with the quality—either in size, distribution or optical efficiency—of materials synthesized in the laboratory." The authors agree that this is only the beginning, and Belcher says that optimizing the quality and size distribution of these biosynthetic nanocrystals are top priorities for future investigation.

Nevertheless, these findings provide encouraging evidence of the potential benefits that could be reaped using bacteria for the synthesis of a variety of products and materials. "I think that it's an exciting new process, just in terms of harnessing the potential of organisms to make materials that they normally don't make," says Belcher. Iverson concurs and sees broad possibilities for optimizing such biological pathways: "This [process] is clearly happening without intervention, and I think there is absolutely no reason to believe that you can't start intervening by putting known nucleators in and controlling their expression and abundance, and try to do things in a very rational way... because these are really good little reactors."

**Michael Eisenstein**

RESEARCH PAPERS

Sweeney, R.Y. *et al.* Bacterial biosynthesis of cadmium sulfide nanocrystals. *Chem. Biol.* **11**, 1553–1559 (2004).

Mao, C. *et al.* Viral assembly of oriented quantum dot nanowires. *Proc. Natl. Acad. Sci. USA* **100**, 6946–6951 (2003).

Dameron, C.T. *et al.* Biosynthesis of cadmium sulphide quantum semiconductor crystallites. *Nature* **338**, 596–597 (1989).



suspected based on *in vitro* data.

To show the potential of DMP even more clearly, Saghatelian plans to expand it in several ways. As the method requires an enzyme-depleted sample, he wants to use RNA interference or chemical inhibitors, rather than the more cumbersome gene knockout method, to reduce enzyme levels. To show that DMP is reproducible and not restricted to discovering FAAH metabolites, he intends to test it with other lipases. Finally, by modifying the way samples are fractionated and prepared for LC-MS, Saghatelian will no longer be restricted to lipophilic compounds but will also be able to include water-soluble metabolites in the analysis, thereby expanding the list of enzymes DMP can be used for.

With all its potential, this method will most likely not be confined to one laboratory for long, and Cravatt has high hopes for the future of DMP: "We anticipate that these findings will inspire every scientist to apply DMP to his or her enzyme of interest to elucidate its endogenous function and facilitate its integration into larger metabolic networks in the cell."

**Nicole Rusk**

RESEARCH PAPERS

Saghatelian, A. *et al.* Assignment of endogenous substrates to enzymes by global metabolite profiling. *Biochemistry* **43**, 14332–14339 (2004).

## NEWS IN BRIEF

CELL BIOLOGY

### Light-activated ion channels for remote control of neuronal firing

Banghart *et al.* describe a specialized chemical gating molecule capable of undergoing light-induced photoisomerization, resulting in the reversible inhibition of ion channel function. They successfully demonstrate the use of the compound, MAL-AZO-QA, to block the action of the voltage-gated Shaker potassium channel in *Xenopus laevis* oocytes and cultured rat hippocampal neurons.

Banghart, M. *et al. Nat. Neurosci.*, published online 21 November 2004.

MICROARRAYS

### Printed covalent glycan array for ligand profiling of diverse glycan binding proteins

Several different kinds of glycan-based arrays have been developed to assess the specificities of glycan binding proteins (GBPs). Blixt *et al.* present an approach that enables the generation of such arrays by the same robotic printing process used for DNA arrays. Studies conducted with such arrays show high sensitivity and reproducibility, with consistently low background.

Blixt, O. *et al. Proc. Natl. Acad. Sci. USA* **101**, 17033–17038 (2004).

GENOMICS

### DNA methylation profiling of the human major histocompatibility complex: A pilot study for the human epigenome project

The Human Epigenome Project was launched just over a year ago with the aim of assembling an atlas of DNA methylation within the regulatory regions of all human genes. Rakyan *et al.* present the outcome of the pilot phase of this project, a DNA methylation profile for the human major histocompatibility complex.

Rakyan, V.K. *et al. PLoS Biology*, published online 23 November 2004.

GENE TRANSFER

### Baculovirus expression system for heterologous multiprotein complexes

Baculoviral vectors can contain large amounts of exogenous DNA, making them appealing candidates for the assembly of multicistronic expression constructs. Berger *et al.* describe a 'multiplication module' strategy for the rapid, iterative assembly of multiple promoter-gene sets within a transfer vector, which can then be recombined into a bacmid for efficient expression.

Berger, I. *et al. Nat. Biotechnol.*, published online 28 November 2004.

RNA INTERFERENCE

### Highly efficient small interfering RNA delivery to primary mammalian neurons induces microRNA-like effects before mRNA degradation

Although RNA interference (RNAi) can be an extremely powerful tool for gene silencing, its use in nervous system studies has been limited by the difficulties involved in transfecting neurons. By conjugating the vector peptide Penetratin 1 to their small interfering RNAs, Davidson *et al.* achieve effective and nontoxic delivery into cultured neurons, and demonstrate successful RNAi for several genes.

Davidson, T.J. *et al. J. Neurosci.* **24**, 10040–10046 (2004).