**Snapshots From the Meeting >>**

**Organic PVs break the 10% barrier.** Researchers from Mitsubishi Chemical Group Science and Technology Research Center in Yokohama, Japan, reported that they’ve created the first organic photovoltaic device that’s more than 10% efficient at converting sunlight to electricity, but they offered few details on the new device.

**Stretchable electronics beat the heat.** Researchers would love to use flexible organic-based integrated circuits (ICs) as implantable electronics for sensors and other health-monitoring devices. But they’ve had trouble making them robust enough to withstand the high temperatures needed to sterilize them. At the meeting, a team from the University of Tokyo reported that it has now created heat-stable organic ICs.

**Looke here.** Researchers at the University of California, Berkeley, have created a new nanowire-based optical probe able to peer within individual cells.

**Large-scale nanocarbons.** Researchers in Japan reported that a new pilot-scale production plant is producing 100 grams of carbon nanotubes per hour and said they’re on track to open a commercial-scale facility in 2014 capable of producing 50 tons per year. Another team, meanwhile, reported being able to synthesize single-atom-thick carbon sheets of graphene in a roll-to-roll setup like those used in printing.

**Can you see me now?** Researchers in California reported using a light-sensitive protein to turn a transistor on and off. The proteins in this case were ion channels able to ferry protons from one side of a cell membrane to another when exposed to light. They were embedded in a lipid coating around a nanowire electrode in the device; when light hit the proteins, they pumped protons away from the nanowire, thereby changing the pH nearby and triggering the transistor to turn on. Down the road, arrays of such devices might be used to make an artificial retina.

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**Al Bids to Vie With Li In Battery Wars**

We love our rechargeable lithium-ion batteries. They drive our cell phones, laptops, power tools, electric cars, and countless other gadgets. And their numbers are rising. The global market for lithium-ion batteries has risen fivefold to $10 billion a year over the past decade. Still, lithium-ion batteries may face tough times ahead. Lithium supplies are limited, and the cost of the metal has skyrocketed in recent years. So researchers are on the lookout for novel battery chemistries. At the meeting, researchers from New York described materials that could pave the way for making rechargeable batteries from aluminum. Because aluminum is one of the most abundant elements on the planet, and is less prone to catching fire than lithium is, it could pave the way to cheaper and safer rechargeables.

Batteries work by shuttling ions back and forth through an electrolyte that sits between two electrodes. At the electrodes, the ions either give away extra electrons during discharge or sop them up during recharging. Numerous researchers have dabbled in making aluminum batteries before. But aluminum ions are larger than lithium ions, and they tend to clump together inside batteries. These aluminum clumps move more slowly between electrodes than lithium ions do, which reduces their conductivity. So in the past, research teams ran their aluminum-ion cells at high temperatures to boost their conductivity. But high-temperature cells aren’t useful for most applications that run at or near room temperature.

In 2010, researchers at Cornell University, led by chemical engineer Lynden Archer, began searching for a way to boost the room-temperature conductivity of aluminum-ion cells. Previous aluminum-ion batteries had used conventional ion-conducting electrolytes, which were poor aluminum-ion conductors. So Archer and his colleagues turned to an electrolyte made from an ionic liquid that sped up the shuttle time for the aluminum ions. They also synthesized vanadium-oxide nanowires for their cathode that were able to harbor more aluminum ions during charging. At the meeting, Archer’s postdoctoral assistant Navaneedhakrishnan Jayaprakash reported that the new cells made with these improvements were rechargeable at room temperature at typical recharge times. After 20 charge-discharge cycles, they had a capacity of 273 milliamp-hours per gram, on par with lithium-ion cells sold today. The results were also published online on 3 November in *Chemical Communications.*

“It’s quite intriguing,” says Paul Braun, a chemist and battery expert at the University of Illinois, Urbana-Champaign. One advantage, Braun says, is that each aluminum ion can ferry three electrons every time it moves between electrodes, whereas lithium ions can carry only one electron. That could help boost the energy-storage capacity of aluminum batteries. But both Braun and Archer note that the new aluminum-ion cells aren’t ready to go up against lithium cells. The ionic liquid electrolyte is too expensive for commercial use. And the anode in the new battery is pure aluminum metal, which after repeated charge-discharge cycles can form tiny metal spears that can damage key parts of the battery. Archer says he and his colleagues are now turning to these and other challenges in hopes of turning one of the most abundant metals into a better battery.

—R.F.S.