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Developments to Watch

Edited by Neil Gross

MATERIALS SCIENCE

More Than Just A Pretty Carapace

Designers of sensors and other electronic parts have found a rich source of inspiration: microscopic sea creatures called diatoms. Scientists say there may be 100,000 different species of these tiny plankton, which are encased in intricate silicon-dioxide shells. The profusion of shapes drew the attention of Kenneth H. Sandhage, professor of materials science at Georgia Institute of Technology, who has already used one diatom as the basis for a new class of gas sensor to detect the pollutant nitric oxide.

Diatoms have many attractive traits beyond their innate beauty. The shells are porous and have a lot of surface area, and can be converted to silicon, the base material for most semiconductors. Best of all, diatoms self-assemble, so if you find or breed a shape you like, nature can do the rest.

MARKET INFO

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MEDICINE

Trimming Away Sick Cells

Gastric reflux, caused by stomach acid backing up into the esophagus, afflicts millions of adults. About 10% of chronic sufferers go on to develop Barrett's esophagus, a condition that can turn into esophageal cancer, which killed 14,000 in the U.S. last year. To avoid that, doctors sometimes have to burn away tissue with lasers or remove part of the esophagus.

BARRX Medical, a private company in Sunnyvale, Calif., has a better way to remove diseased cells. Its HALO90 system consists of a tiny electrode attached to the tip of an endoscope, which allows the doctor to focus heat precisely on the diseased tissue. On the market since last year, the device is racking up positive clinical data, some of which will be released in May. It shows a 98% cure rate after 3 years, according to BARRX. The procedure takes less than 26 minutes to perform on an outpatient basis.

By Catherine Arnst

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MEDICAL TECHNOLOGY

When Stents Don't Make Sense

Stents used to prop open arteries are known to cause blood clots and heart attacks in some patients. There are other problems: They are often misplaced in the blood vessel. And because doctors lack the means to examine plaque on the walls of arteries, they end up using stents on patients who might not need them. What's more, standard angiograms peer into arteries from the outside, so all blood vessels narrowed by plaque look pretty much the same. As a result, doctors simply insert stents at the narrow points.

Volcano (**[VOLC](#)**), a medical-device maker, tackles these problems with a tiny catheter that has 64 ultrasound transducers. The device bounces sound waves off the artery walls from within, showing details angiograms don't reveal. This system can distinguish among eight different kinds of plaque, only some of which are likely to rupture and cause heart attacks.

Volcano is also able to measure pressure differences in the vessel, showing how much a particular narrowing is affecting blood flow. If both of those technologies were widely used, the company contends, doctors would stint on stents.

By John Carey

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Of Neural Sound Waves And Raging Hormones

— Every day, millions of people undergo medical procedures requiring anesthesia. Yet the mechanism that produces this somnolent state is unknown. Physicists Thomas Heimburg and Andrew Jackson at the University of Copenhagen have presented evidence for a radical explanation: sound waves. Their research, if correct, challenges the conventional wisdom that nerves are switched on or off by electrical currents. "The information that is encoded in the nerve pulse comes from electrical energy, but the way it is carried, we believe, is by pressure waves such as sound," says Jackson.

— Here's another neural enigma: the cause of violent mood swings among teenagers. Researchers at SUNY Downstate Medical Center propose in *Nature Neuroscience* that a hormone called THP, which normally has a tranquilizing effect, reverses its role in adolescence and triggers anxiety. The hormone interacts with a brain receptor called GABA-A, which is associated with relaxed states and is the target of many sedative drugs.

By Kerry Capell

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