Black Silicon Revolutionizes How Light Is Captured And Stored

Harvard University

In 1999 Harvard University physics professor Eric Mazur accidentally created a remarkable new material in his laboratory by subjecting gray silicon to ultra-short bursts of energy from a high-intensity laser. He discovered the surface of the now-blackened silicon was covered by billions of tiny, needle-like spikes of silica only one-hundredth the diameter of a human hair.

Mazur and his research team quickly realized this new material, which he named black silicon, had excellent light-absorbing properties. Funding for additional research was provided by the U.S. Army Research Office, National Science Foundation, and the U.S. Department of Energy.

> *Black silicon can absorb 96 to 98 percent of the light that hits it — giving it highly sensitive and unique optical and electronic properties.*

Black silicon can absorb visible light and infrared radiation (heat) at unprecedented levels. For comparison, normal gray silicon absorbs only about 60 percent of sunlight that strikes its surface.

This technology is currently being developed by Massachusetts-based Sionyx, Inc. Possible applications include manufacturing very sensitive and inexpensive photodetectors for high resolution cameras, day/night cameras for security and surveillance, and high-sensitivity detectors and imagers for biotechnology applications. Because it also absorbs heat, black silicon is an excellent detector of clouds, pollution, water vapor and other atmospheric effects that influence climates. Other possible products include disposable chemical/biological sensors and improved thin-screen displays.

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