

A Blacker Black: Darkest Known Material Created

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for [National Geographic News](#)

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Scientists have delivered a crushing blow to fans of the cult movie *This is Spinal Tap*—a material even blacker than the band's black album cover.

In the 1984 film, lead guitarist Nigel Tufnel looks at the album cover for the first time and opines, "It's like, how much more black could this be? And the answer is none, none, none more black."

But Pulickel Ajayan, a professor of engineering at Rice University in Houston, Texas, and colleagues at Rensselaer Polytechnic Institute in Troy, New York, have created a blacker black.

Theirs is an array of tiny carbon cylinders standing on end like bristles on a brush that reflects only 0.045 percent of the visible light shined on it.

"It definitely makes a very dark material," Ajayan said. "In fact, better than what is reported as the darkest material in the Guinness Book of World Records."

The team reported the findings this month in the journal *Nano Letters* and applied to Guinness for record-holder status.

The current record holder is a nickel-phosphorus alloy created by scientists in 2003 at the National Physical Laboratory in London. It reflects 0.35 percent of visible light.

An actual black album cover reflects about 5 percent of the light.

From Solar Power to Art

Pure academic curiosity drove Ajayan and his colleagues to create their superdark material, which may now find wide-ranging practical applications.

Theory suggests this type of array of carbon nanotubes—one-atom-thick carbon sheets rolled into cylinders—may just be the perfect absorber, Ajayan said. Carbon is one of nature's darkest materials.

His team arranged the carbon nanotubes on end, because the spaces between the tubes—the gaps—allow for efficient trapping of light.

In addition, the tubes are meshed together at the top to create an uneven surface that better scatters the light.

The ability of the carbon nanotube array to absorb light could be helpful to the booming field of [solar energy](#), Ajayan noted.

The blackness could soak up nearly all the sunlight shined on it, making the light available for conversion to electricity. The trick would be retaining potential energy by avoiding loss from radiation or during the conversion process.

"An absorber is one thing," Ajayan said. "Making a device is a further [challenge]. But certainly, it does give you an opportunity to have at least one part of this device more efficient than it used to be."

Ajayan also reported interest from artists who may want to incorporate the blackest black into their works.

"People are very curious," he noted. "People have seen black objects, and somebody says this is blacker than that. It's a tough thing to comprehend."

Dark Matter Clues?

Most of the mass in the universe is made of dark matter, a mysterious substance that does not absorb, give off, or reflect any visible light. The nature of this substance is one the greatest unknowns in science.

(Related news: ["Dark Matter Mapped in 3-D, Scientists Report"](#) [January 8, 2007].)

While the new material is "very clever," it sheds no light on the mysterious nature of dark matter, according to Richard Massey, a dark matter expert at the California Institute of Technology in Pasadena.

"This new material absorbs all light without reemitting/reflecting any—hence no light reaches us from it, and it appears dark," he said in an email.

By contrast "astronomers' dark matter absorbs no light," Massey said. Instead scientists think light passes straight through it, he explained, so the matter has no light to emit or reflect.

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