

# The Color No One Can See

by Elizabeth Tracy

**A**s you walk through the art museum, you spot a weird black shape. What is it? It looks like someone punched a hole in the room. From the side, you can see the outline of a head. But there are no little glints of light from the nose. No darker shadows under the chin. Just...black. The blackest black there is. What is this stuff? Who made it? And where can you get some?

## The Darkest Black

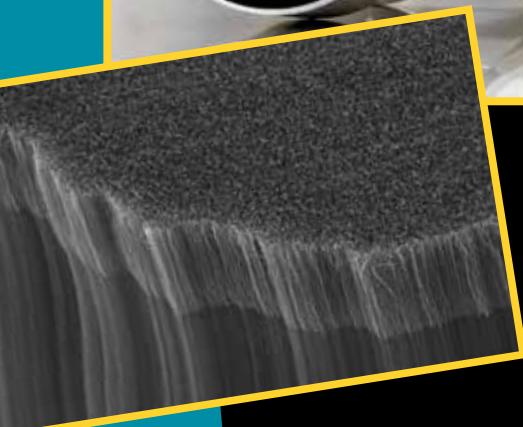
The mysterious statue is coated all over with the world's darkest black. It was invented to help weather satellites take better pictures from space. "Space seems dark, but actually, it's really bright," says Ben Jensen, who worked on the new color. There's a lot of glow from the sun, moon, and Earth. Climate scientists wanted something to cut the glare, to give satellites a sharper view of Earth.



This bronze head has been coated with Vantablack, the blackest black ever.



Vantablack's most important job is to keep the insides of space telescopes and cameras dark. Light reflecting off the inside of a metal tube can make blurry space photos.



A team at Surrey NanoSystems came up with a solution: a coating made out of tiny carbon straws, or nanotubes.

Carbon nanotubes are so small, 10,000 would fit inside a single strand of your hair. The team found if they arranged the nanotubes standing upright like a tiny forest, it soaked up light. Light enters the forest and bounces around, trapped.

Gradually it seeps out (as heat) through the base. The inventors called their tiny forest

VANTA, which stands for "vertically aligned nanotube array." Their crazy new material became Vantablack.

Vantablack is an amazing light catcher. It absorbs 99.96% of all light that hits it. It is so black it tricks the eye. With no light reflecting back, anything coated in Vantablack seems to flatten and disappear. Even bumpy crumpled foil or a sculpture looks like a dark gap in the universe.

Seen under a microscope, Vantablack looks like a forest of thin carbon nanotubes.



Artist Diemut Strebe's artwork *The Redemption of Vanity* plays with idea of opposites uniting. She worked with scientists at MIT to develop a new super-black that absorbs 99.99% of light. Then the MIT team grew it on a \$2 million diamond, hiding it completely. Diamonds and carbon nanotubes are both carbon, so it's carbon hidden by carbon!

## Art Fight!

Even though it was made for scientists, artists couldn't wait to get their hands on this strange new color. The famous sculptor Anish Kapoor was particularly eager. He paid Surrey NanoSystems to let him use Vantablack—and not to sell it to any other artists.

Other artists were furious. Stuart Semple, who loves to paint in bright colors, asked Kapoor to share. When Kapoor refused, Semple said he would sell his own color, "The World's Pinkest Pink," to any artist—except Anish Kapoor. And soon a color battle broke out.

How can anyone own a color? Well, you can't really. Colors are wavelengths of light, after all. But companies can own the way to make a particular paint or coating. That's especially true for high-tech (and expensive) colors like Vantablack. As Jensen says, "We don't own the color black. But we do own the technology to create this shade of black."

## Into the Black

Kapoor is keeping his new artwork secret, but he's been working on a

The flamingos will be so excited!



The World's Pinkest Pink is another fun color, as long as you are not Anish Kapoor.

## Nature's Artists

Deep in the forests of New Guinea, the superb bird of paradise sports a black feather coat that is almost as dark as Vantablack. Under a microscope, its black feathers look like tiny brushes. These feathers trap light in a way similar to the carbon tubes of Vantablack. Light bounces around until almost none escapes. The feathers capture up to 99.95% of light. Birds of paradise put on elaborate dances to attract mates. Their super black probably evolved to make their other colors pop.

Raja Brooke butterflies also wear a very dark black. Up close, their wing scales are covered in deep ridges and gaping holes. The scales drink in light and can rival the best nanotechnology scientists have to offer.

The superb bird of paradise uses its superb black feathers to show off its equally superb blue.



Normal black feather coated in gold



Riflebird feather

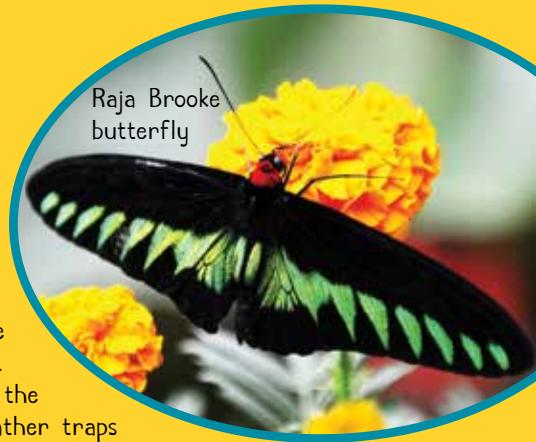
Normal feather

Riflebird feather coated in gold



These photos show extreme close-ups of a normal feather and a black feather of the paradise riflebird.

Tiny ridges in the riflebird's feather trap light. Even coated in gold, they still look black as long as the light-trapping combs stay bushy.



Raja Brooke butterfly

mind-blowing show. Once he's made his sculpture, the Vantablack has to be sprayed and baked on in a special lab. And nanotubes are easily damaged. So, no touching!

Stuart Semple is not waiting around for Vantablack. He has invented his own super-black paints for artists, magicians, photographers, and astronomers. His Black 3.0 uses tiny ceramic spheres to scatter light. "We don't think differently," says Semple about artists and scientists. "We all just want to create."

Meanwhile, Vantablack is hard at work in satellites, cameras, and the sensors of self-driving cars. Someday you might see it (or not) in movie screens, to help colors pop. And Surrey NanoSystems is always trying to improve it. New versions are easier to apply and cost less. Some trap light with tiny bumps instead of a forest of tubes. They are also working on new amazing colors. One is super-black. The other is top secret! We'll just have to wait and see...or not. 🚀

This super black will be perfect for sneaking up on Plush!

