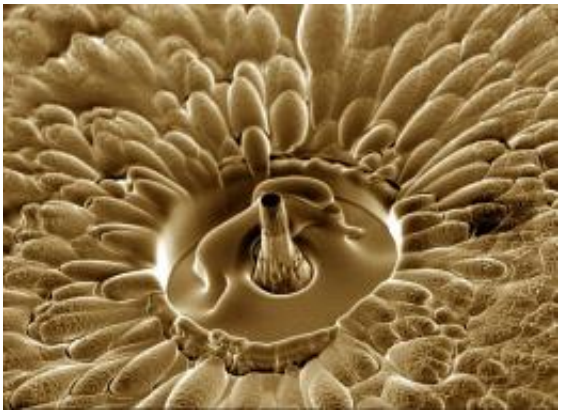
Hidden beauty of the nano-cosmos

October 12 2011



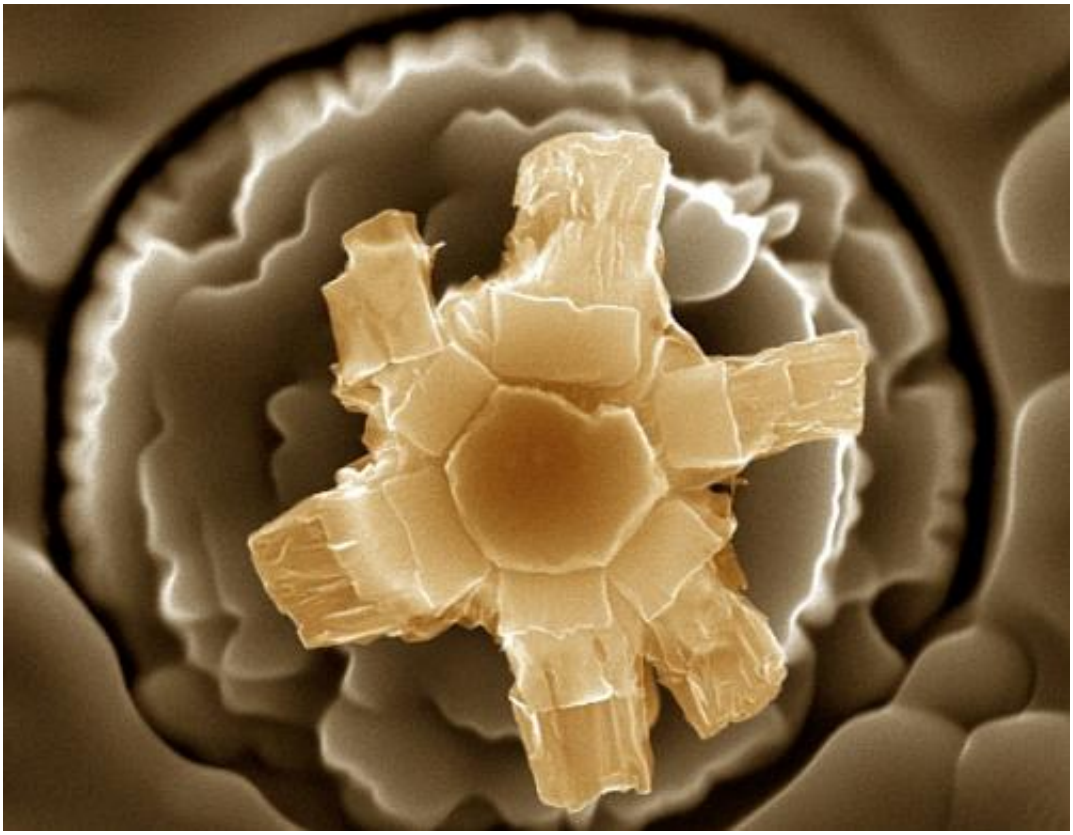
Award-winning image: Many brushes made from carbon nanotubes are formed into a tower 500 nanometres in diameter by using a focused ion beam system. The scanning electron microscope is used to investigate how they behave under the effects of pressure.

When researchers receive prizes, it is usually to honour their scientific work. However, the photographs from the scanning electron microscope, taken by Siddhartha Pathak during his postdoctoral time at Empa in Thun, Switzerland, have already been recognised several times for their aesthetic value. This was the case again recently, this time at "NanoArt 2011", where he was awarded first prize.

It is possible to create real works of art simply from the series of points of an electron microscope image. Siddhartha Pathak proved this more than once during his time as a postdoctoral researcher in Thun. While working in the "Mechanics of Materials and Nanostructures" and

"Advanced Materials Processing" laboratories, he frequently invested time creating visually appealing images from the objects of his study.

In his projects in the field of the micromechanics of materials, he pursued the question of how materials from the macro-world behave when they are shrunk to the micro and nanometre scale. Thus, using a focused ion beam system (FIB), he built towers 500 nanometres in diameter from a high-density carpet made of carbon nanotubes. During stress experiments, he wanted to discover at what pressure these buckle. Result: The towers withstand very high loads and are thus suitable candidates for energy-absorbing applications in micromechanical systems.



A tower made of carbon nanotubes following the stress test.

This resulted in fascinating pictures. It is amazing because an electron microscope first scans over the topographical conditions of nanoscale structures virtually "blindly". From the "sensed" mountains and valleys, maps are then created by stringing together the points. The shapes produced invite "embellishment" with colours. Pathak understood how to conjure up eye-catching and appealing shapes from the black and white images. Johann Michler, Head of the "Mechanics of Materials and Nanostructures" laboratory, said of his former employee: "I think it was his playful instinct and love of unusual ideas that drove him." Pathak also has the necessary sporting spirit to compete with others in this area. For this reason, he liked to take part in competitions where the hidden beauty of the nano-world was the subject.

Pathak and his colleagues have already won five prizes. Only recently, Pathak, who is currently at the "California Institute of Technology" and is researching the microscopic deformation mechanisms of materials for use in space under extreme conditions, managed to win first prize for one of his images in the international online competition "NanoArt21" What remains for science, however, is a different kind of prize, says Michler: "A good cover picture in a professional journal, on the other hand, can still be found in the annals of science for decades." Pathak has also been successful here. In 2010, one of his pictures made it onto the front cover of the professional journal *Materials Today*.

More information: www.nanoart21.org/

Provided by EMPA

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