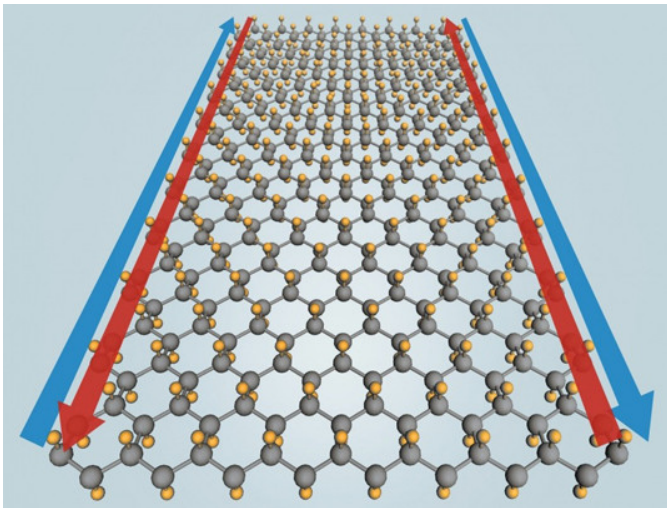


The Next Wonder Material: Tin?

Written by Marco Attard
04 December 2013

Another material joins the likes of [graphene](#) and [carbon nanotubes](#) in the silicon-killer arena-- "statene," a single layer of tin atoms theoretically able to conduct electricity with 100% efficiency at the temperatures computer chips operate.



The discovery of US, Chinese and German researchers, the properties of statene are detailed in a paper titled "Large-Gap Quantum Spin Hall Insulators in Tin Films." Apparently the material is a "topological insulator," meaning it conducts electricity only along the edges or surfaces of their structure, not through the interior.

Such a property comes into play when the structure is all of 1 atom thick, since it allows for 100% efficient electrical efficiency through "complex interactions between the electrons and nuclei of heavy atoms in the materials."

"The magic of topological insulators is that by their very nature, they force electrons to move in defined lanes without any speed limit, like the German autobahn," team leader Shoucheng Zhang said. "As long as they're on the freeway-- the edges or surfaces-- the electrons will travel without resistance."

According to the researchers a single layer of pure tin atoms operates as a topological insulator at and above room temperatures, while the addition of fluorine atoms extends operating range to "at least" 100 degrees celsius.

The Next Wonder Material: Tin?

Written by Marco Attard
04 December 2013

The team already worked on a number of alternate topological insulators, including mercury telluride and combinations of bismuth, antimony, selenium and tellurium, but none are as good as tin.

It all sounds promising enough-- although how one will deposit atom-thick tin layers during the manufacturing process remains a challenge. However the researchers remain optimistic. "We can imagine stanene being used for many more circuit structures, including replacing silicon in the hearts of transistors," Zhang says. "Someday we might even call this area Tin Valley rather than Silicon Valley."

Go [Will 2D Tin Be the Next Super Material?](#)

Go [Large-Gap Quantum Spin Hall Insulators in Tin Films](#)