Nano-twinned copper: Chinese-Danish scientists develop super strong nanometals

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Research shows that it is possible to produce copper about 4 times stronger than commercial material - and doing so while also having a ductile material. As the thermal and electrical conductivity are also good, the manufacturing of, for example, electrical conductors with improved mechanical properties looks promising.

The strength of metal depends on the microstructure - the finer the structure the stronger the metal. But one may wonder if this fundamental principle also applies to extremely fine structures?

Materials scientists worldwide have taken up this challenge and now a Chinese-Danish research collaboration has lead to a break-through in the understanding. The results are scientifically important, but also of interest to technology.

As expected, the strength of copper material increases when the structure becomes finer but when the structure dimension becomes smaller than 15 nanometers the metal unexpectedly becomes softer. The physical processes giving rise to this unusual softening have also been identified based on electron microscopy studies of the structure.

Super strong nanometals are perfect for continuation of the research collaboration between China and Denmark and their exploitation in practical applications are indeed promising.

Publication: The results have been published in the journal Science 30

Jan 2009 (vol. 323. no. 5914, pp. 607-610) entitled "Revealing the maximum strength in nano-twinned copper."

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