Scientists create laser-activated superconductor

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Shining lasers at superconductors can make them work at higher temperatures, suggests new findings from an international team of scientists including the University of Bath.

Superconductors are materials that conduct electricity without power loss and produce strong magnetic fields. They are used in medical scanners, super-fast electronic circuits and in Maglev trains which use superconducting magnets to make the train hover above the tracks, eliminating friction.

Currently superconductors only work at very low temperatures, requiring liquid nitrogen or helium to maintain their temperature. Now scientists publishing in the prestigious journal *Nature* have found a way to make certain materials superconduct at higher temperatures.

The team, led by the Max Planck Institute for the Structure and Dynamics of Matter and including the Universities of Bath and Oxford, shone a laser at a material made up from potassium atoms and carbon atoms arranged in bucky ball structures and found it to still be superconducting at more than 100 degrees Kelvin—around minus 170 degrees Celsius.

The researchers hope these findings could lead to new routes and insights into making better superconductors that work at higher temperatures.

Superconducting at higher temperatures

Dr Stephen Clark, theoretical physicist at the University of Bath, worked with his experimental physicist colleagues to try to understand how superconductivity might emerge when the material is exposed to laser radiation.

He explained: "Superconductors currently only work at very low temperatures, requiring expensive cryogenics—if we can design materials that superconduct at higher temperatures, or even room temperature, it would eliminate the need for cooling, which would make them less expensive and more practical to use in a variety of applications.

"Our research has shown we can use lasers to make a material into a superconductor at much higher temperatures than it would do naturally. But having taken this first step, my colleagues and I will be trying to find other superconductors that can be coerced to work at even higher temperatures, possibly even at room temperature.

"Whilst this is a small piece of a very large puzzle, our findings provide a new pathway for engineering and controlling superconductivity that might help stimulate future breakthroughs."

More information: M. Mitrano et al. Possible light-induced superconductivity in K3C60 at high temperature, *Nature* (2016). DOI: 10.1038/nature16522

Provided by University of Bath