

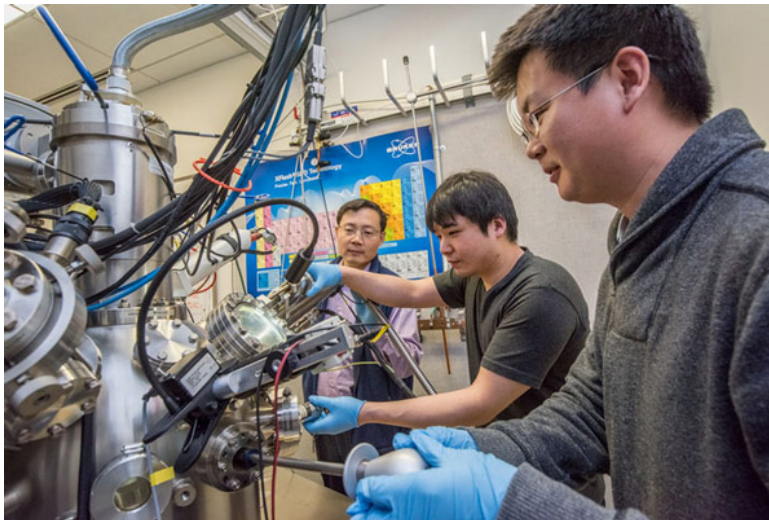
Detecting material transmitting electricity but not transmitting heat, contrary to the law in textbooks

Tests for VO₂ show that the metal transmits electricity without transmitting heat.

Vanadium dioxide (VO₂), which is the name of a special, conductive metal that does not transfer heat, was announced by scientists. VO₂ with its special features can lead wires to a new history.

VO₂ was first discovered in 2017. At that time, scientists were extremely surprised by its features that went against Wiedemann-Franz's Law - good conductors will conduct heat well, cause causing electrical appliances to be operated continuously to heat up.

Tests for VO₂ show that the metal transmits electricity without transmitting heat. In its natural state, VO₂ is inherently strange. At temperatures below 32 degrees Celsius, a block of VO₂ glass will be transparent but when at temperatures above 60 degrees Celsius, it will darken, turn into a kind of light shield and let electricity flow through.



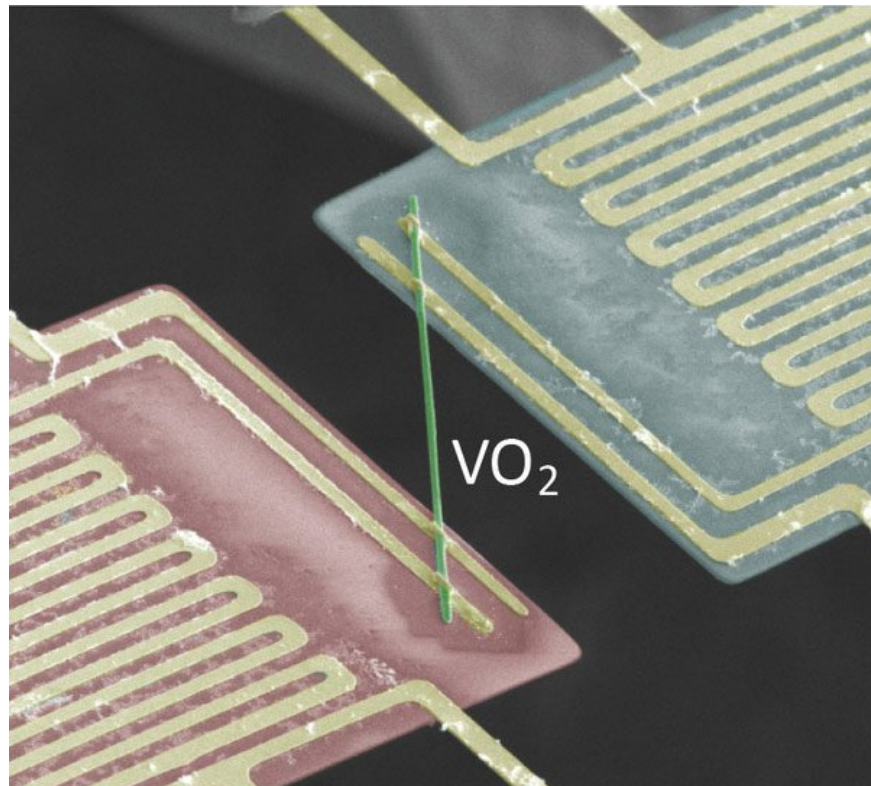
VO₂ is tested by scientists from Berkeley Lab.

Junqiao Wu, head of research at Berkeley Lab, said the discovery of VO₂ is of great importance, allowing us to understand the nature of exotic conductive materials.

Previously, researchers have also found some substances that can conduct electricity better than conduct heat, but only if the material is in a hundred-degree negative environment. Particularly with VO₂, it can transmit electricity only at warm temperatures, so its practical applicability is immense.

Looking at how electrons move inside the VO₂ crystal lattice, the researchers found that the heat transfer generated inside VO₂ when the electrons moved was 10 times smaller than the amount that Wiedemann-Franz's Law pointed out. This shows that the electrons in VO₂ have moved in a way that is different from how they behave in the single particle form of electrons in the common metal we often see.

According to Professor Wu, the electrons in VO₂ move in a uniform way which is no different from fluid flow so there is not much heat generated.



In particular, when mixing VO₂ with other materials, the researchers can adjust the amount of electricity and the amount of heat moving inside the material. For example, when tungsten is mixed into VO₂, the newly created compound is able to conduct heat more efficiently. This means that VO₂ has the ability to dissipate heat when heated to a certain temperature, while it has not yet reached that temperature it is an insulator.

1. Successfully fabricated flexible glass, which can only be bent, not broken
2. There is evidence that confirms the existence of a fifth force, which can reverse the physics we still know
3. Successfully manufactured meat from the air

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