Scientists suggest titanium nitride instead of gold in optoelectronics

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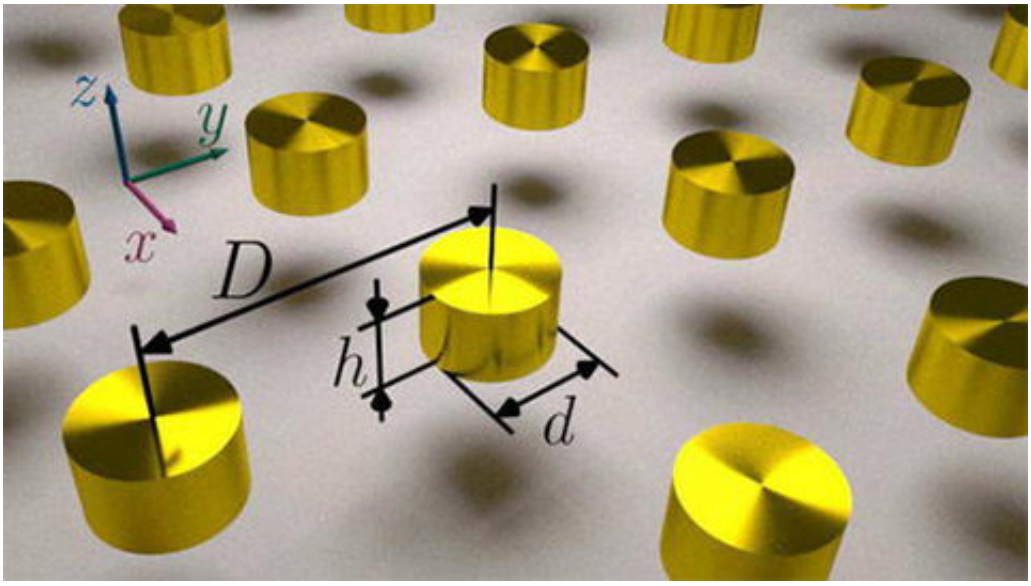

Credit: Siberian Federal University

An international team of scientists from Russia, Sweden and the U.S. suggested replacing the gold and silver used in optoelectronic devices with an inexpensive material of titanium nitride. The results of the study are published in the journal *Applied Physics Letters*.

"Titanium nitride has excellent anti-corrosion and thermal stability properties, it is non-toxic and is synthesized easily and cheaply," says Ilya Rasskazov from the University of Illinois at Urbana-Champaign.

In order to make optoelectronic devices faster and more accurate, researchers use plasmon resonance, in which an electromagnetic wave generated by the action of light spreads over a metal surface. Plasma resonance can be obtained with noble metals, but not in the telecommunications wavelength range used in most digital technology.

"The vast majority of digital technology functions in the telecommunications frequency range, but gold and silver, widely used in the field of plasmonics, don't provide such an effect," said Sergei Polyutov, head of the research at SFU.

Siberian scientists proposed using titanium nitride instead of gold and silver. Titanium nitride is a substance that is used for gilding church domes, for instance. Studies of this material have shown that it produces a plasmon resonance with a Q-factor several thousand times greater than gold. This means that it preserves energy better and the wave oscillations do not fade in it longer.

The interest of scientists is more practical—introducing the material into the production of optoelectronic devices. In the future, it will be possible to build ultrasensitive sensors for medicine, in infrared vibration spectroscopy.

Provided by Siberian Federal University

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