New technology using silver may hold key to electronics advances

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CORVALLIS, Ore. - Engineers at Oregon State University have invented a way to fabricate silver, a highly conductive metal, for printed electronics that are produced at room temperature.

There may be broad applications in microelectronics, sensors, energy devices, low emissivity coatings and even transparent displays.

A patent has been applied for on the technology, which is now available for further commercial development. The findings were reported in Journal of Materials Chemistry C.

Silver has long been considered for the advantages it offers in electronic devices. Because of its conductive properties, it is efficient and also stays cool. But manufacturers have often needed high temperatures in the processes they use to make the devices, adding to their cost and complexity, and making them unsuitable for use on some substrates, such as plastics that might melt or papers that might burn.

This advance may open the door to much wider use of silver and other conductors in electronics applications, researchers said.

"There's a great deal of interest in printed electronics, because they're fast, cheap, can be done in small volumes and changed easily," said Chih-hung Chang, a professor in the OSU College of Engineering. "But the heat needed for most applications of silver nanoparticles has limited their use."

OSU scientists have solved that problem by using a microreactor to create silver nanoparticles at room temperatures without any protective coating, and then immediately printing them onto almost any substrate with a continuous flow process.

"Because we could now use different substrates such as plastics, glass or even paper, these electronics could be flexible, very inexpensive and stable," Chang said. "This could be quite important and allow us to use silver in many more types of electronic applications."

Among those, he said, could be solar cells, printed circuit boards, low-emissivity coatings, or transparent electronics. A microchannel applicator used in the system will allow the creation of smaller, more complex electronics features.

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