

GraphExeter: New graphene-based material could revolutionise electronics industry

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University of Exeter researchers Dr Monica Craciun and Dr Saverio Russo.

(Phys.org) -- The most transparent, lightweight and flexible material ever for conducting electricity has been invented by a team from the University of Exeter.

Called GraphExeter, the material could revolutionise the creation of wearable electronic devices, such as clothing containing computers, phones and MP3 players.

GraphExeter could also be used for the creation of 'smart' mirrors or windows, with computerised interactive features. Since this material is also transparent over a wide light spectrum, it could enhance by more than 30% the efficiency of solar panels.



Adapted from graphene, GraphExeter is much more flexible than indium tin oxide (ITO), the main conductive material currently used in electronics. ITO is becoming increasingly expensive and is a finite resource, expected to run out in 2017.

These research findings are published in *Advanced Materials*, a leading journal in materials science.

At just one-atom-thick, graphene is the thinnest substance capable of conducting electricity. It is very flexible and is one of the strongest known <u>materials</u>. The race has been on for scientists and engineers to adapt graphene for flexible electronics. This has been a challenge because of its sheet resistance, which limits its conductivity. Until now, no-one has been able to produce a viable alternative to ITO.

To create GraphExeter, the Exeter team sandwiched molecules of ferric chloride between two layers of graphene. Ferric chloride enhances the electrical conductivity of graphene, without affecting the material's transparency.

The material was produced by a team from the University of Exeter's Centre for <u>Graphene</u> Science. The research team is now developing a spray-on version of GraphExeter, which could be applied straight onto fabrics, mirrors and windows.

Lead researcher, University of Exeter engineer Dr Monica Craciun said: "GraphExeter could revolutionise the electronics industry. It outperforms any other carbon-based transparent conductor used in electronics and could be used for a range of applications, from solar panels to 'smart' teeshirts. We are very excited about the potential of this material and look forward to seeing where it can take the <u>electronics</u> <u>industry</u> in the future."



More information: <u>onlinelibrary.wiley.com/doi/10</u> <u>a.201200489/abstract</u>

Provided by University of Exeter

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