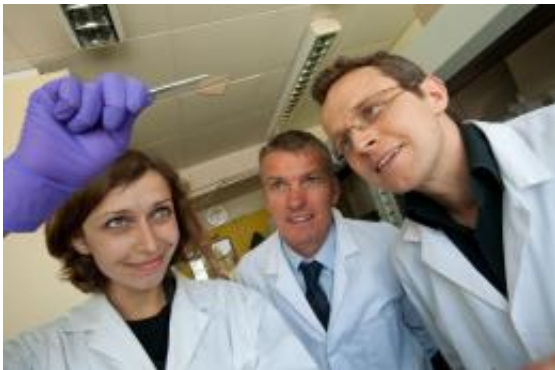


Researchers develop golden window electrodes for organic solar cells

April 6 2011



Researchers at the University of Warwick have developed a gold plated window as the transparent electrode for organic solar cells. Contrary to what one might expect, these electrodes have the potential to be relatively cheap since the thickness of gold used is only 8 billionths of a metre. This ultra-low thickness means that even at the current high gold price the cost of the gold needed to fabricate one square metre of this electrode is only around £4.5. It can also be readily recouped from the organic solar cell at the end of its life and since gold is already widely used to form reliable interconnects it is no stranger to the electronics industry.

Organic solar cells have long relied on Indium Tin Oxide (ITO) coated glass as the [transparent electrode](#), although this is largely due to the

absence of a suitable alternative. ITO is a complex, unstable material with a high surface roughness and tendency to crack upon bending if supported on a plastic substrate. If that wasn't bad enough one of its key components, indium, is in short supply making it relatively expensive to use.

An ultra-thin film of air-stable metal like gold would offer a viable alternative to ITO, but until now it has not proved possible to deposit a film thin enough to be transparent without being too fragile and electrically resistive to be useful.

Now research led by Dr Ross Hatton and Professor Tim Jones in the University of Warwick's department of Chemistry has developed a rapid method for the preparation of robust, ultra-thin gold films on glass. Importantly this method can be scaled up for large area applications like solar cells and the resulting electrodes are chemically very well-defined.

Dr Hatton says "This new method of creating gold based transparent electrodes is potentially widely applicable for a variety of large area applications, particularly where stable, chemically well-defined, ultra-smooth platform [electrodes](#) are required, such as in organic optoelectronics and the emerging fields of nanoelectronics and nanophotonics"

The full research paper entitled [Ultrathin Transparent Au Electrodes for Organic Photovoltaics Fabricated Using a Mixed Mono-Molecular Nucleation Layer](#) is published in *Advanced Functional Materials*.

The paper documents the team's success in creating this simple, practical and effective method of depositing the films onto glass, and also reports how the optical properties can be fine tuned by perforating the film with tiny circular holes using something as simple as polystyrene balls. The University of Warwick research team has also had some early success in

depositing ultra-thin [gold](#) films directly on plastic substrates, an important step towards realising the holy grail of truly flexible [solar cells](#). This innovation is set to be exploited by Molecular Solar Ltd, a Warwick spinout company dedicated to commercialising the discoveries of its academic founders in the area of [organic solar cells](#).

Provided by University of Warwick

Citation: Researchers develop golden window electrodes for organic solar cells (2011, April 6) retrieved 27 April 2024 from

<https://phys.org/news/2011-04-golden-window-electrodes-solar-cells.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--