First graphene-based display unveiled

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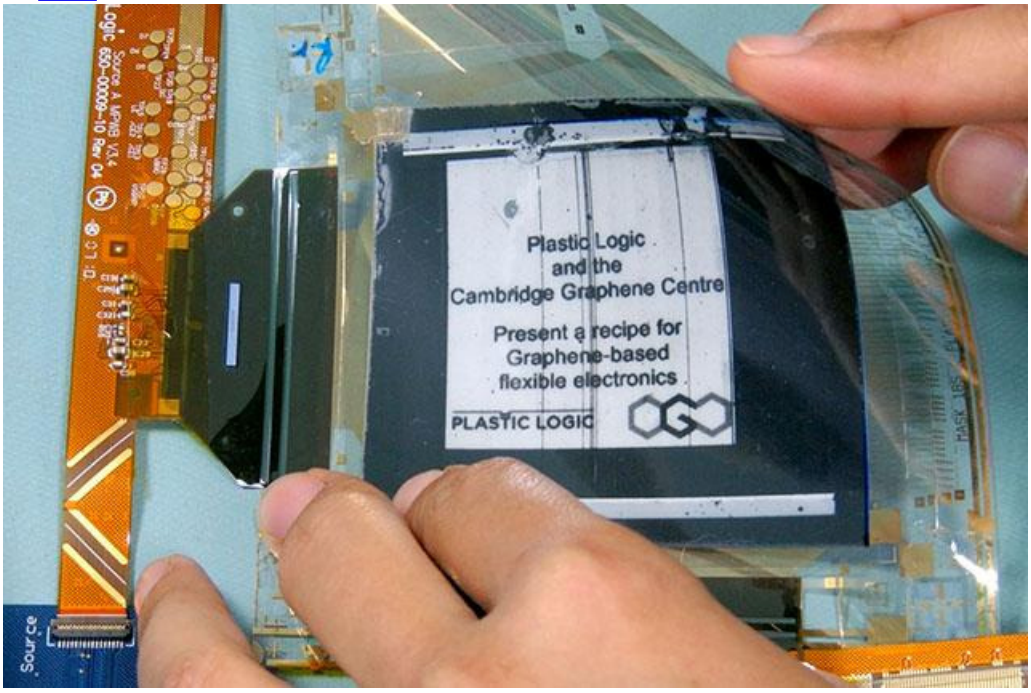

Active matrix electrophoretic display incorporating graphene created by Cambridge-based researchers

The world's first flexible graphene display has been created by UK researchers, paving the way for printable, foldable electronics.

The display developed by the Cambridge Graphene Centre and Plastic Logic, a spin-off company from Cambridge University, is similar to electronic paper used in today's e-readers. The main difference is that it's made of flexible plastic instead of glass and that it incorporates graphene in its pixels.

"We are happy to see our collaboration with Plastic Logic resulting in the first graphene-based electrophoretic display exploiting graphene in its pixels' electronics," said Professor Andrea Ferrari, Director of the Cambridge Graphene Centre. "This is a significant step forward to enable fully wearable and flexible devices."

To create the display, researchers used a conventional plastic display developed by Plastic Logic and replaced the sputtered metal electrode layer within the device's backplane with a solution-processed graphene electrode.

"The potential of graphene is well-known, but industrial process engineering is now required to transition graphene from laboratories to industry," said Indro Mukerjee, CEO of Plastic Logic. "This demonstration puts Plastic Logic at the forefront of this development, which will soon enable a new generation of ultra-flexible and even foldable electronics"

To create the 150 pixel per inch display, the engineers used Plastic Logic's Organic Thin Film Transistor technology and deposited the graphene solution onto it. The whole process required relatively low temperatures under 100°C. The resulting backplane was subsequently covered with an electrophoretic imaging film to create an ultra-low power and durable display.

The team hopes to further advance the technology by incorporating liquid crystal (LCD) and organic light emitting diodes (OLED) technology into it to achieve full colour and video functionality. Lightweight flexible active-matrix backplanes may also be used for sensors, with novel digital medical imaging and gesture recognition applications already in development.

The project was funded by the Engineering and Physical Sciences Research Council (EPSRC) and the EU's Graphene Flagship. The two entities involved also received further financial support from the UK Technology Strategy Board, as part of the graphene revolution initiative.

Graphene's potential to revolutionise electronics has been at the forefront of scientific interest since the wonder material was first isolated in 2004.

A two-dimensional sheet of carbon atoms, Graphene is more flexible than conventional ceramic alternatives like indium-tin oxide and more transparent than metal films. The ultra-flexible graphene layer may enable a wide range of products, including foldable

electronics. Graphene's ability to be used in a solution opens further possibilities for printing and roll-to-roll applications.

Watch Plastic Logic's video below:

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