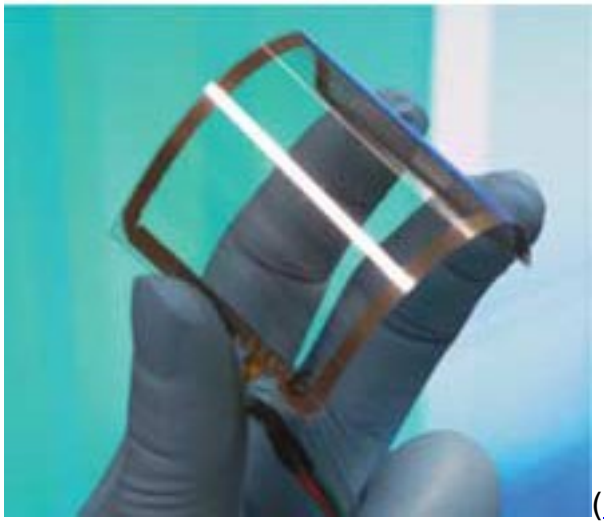
Printed Graphene Tech Brings Promise for Better Displays



(MIT TechnologyReview [1]) - Graphene, a sheet of carbon just one atom thick, has spectacular strength, flexibility, transparency, and electrical conductivity. Spurred on by its potential for application in new devices like touch screens and solar cells, researchers have been toying with ways to make large sheets of pure graphene, for example by shaving off atom-thin flakes and chemically dissolving chunks of graphite oxide. Yet in the thirty-some years since graphene's discovery, laboratory experiments have mainly yielded mere flecks of the stuff, and mass manufacture has seemed a long way away.

"The future of the field certainly isn't flaking off pencil shavings," says Michael Strano, a professor of chemical engineering at MIT. "The large-area production of monolayer graphene was a serious technological hurdle to advancing graphene technology."

Now, besting all previous records for synthesis of graphene in the laboratory, researchers at Samsung and Sungkyunkwan University, in Korea, have produced a continuous layer of pure graphene the size of a large television, spooling it out through rollers on top of a flexible, see-through, 63-centimeter-wide polyester sheet.

"It is engineering at its finest," says James Tour, a professor of chemistry at Rice University who has been working on ways to make graphene by dissolving chunks of graphite. "[People have made] it in a lab in little tiny sheets, but never on a machine like this."

The team has already created a flexible touch screen by using the polymer-supported graphene to make the screen's transparent electrodes. The material currently used to make transparent electronics, indium tin oxide, is expensive and brittle. Producing graphene on polyester sheets that bend is the first step to making

transparent electronics that are stronger, cheaper, and more flexible. "You could theoretically roll up your iPhone and stick it behind your ear like a pencil," says Tour.

The Korean team built on rapid advances in recent months. "The field really has advanced in the past 18 months," says Strano. "What they show here is essentially a monolayer over enormous areas--much larger than we've seen in the past."

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