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ESI Special Topics, February 2007
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From • > >February 2007

John A. Rogers answers a few questions about this month's emerging research front in the field of Materials Science.

Materials Science

Article: Bendable single crystal silicon thin film transistors formed by printing on plastic substrates

Authors: Menard, E;Nuzzo, RG;**Rogers, JA**
Journal: APPL PHYS LETT, 86 (9): art. no.-093507, FEB 28 2005
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ST: Why do you think your paper is highly cited?

The paper describes a single crystal, inorganic semiconductor approach to flexible electronics. This material strategy provides an alternative to the more heavily explored, but lower performance, amorphous and polycrystalline semiconductors for these systems. Interest in the work might be associated with this aspect.

"The paper introduces a type of thin film transistor that uses aligned arrays of

ST: Does it describe a new discovery or a new methodology that's useful to others?

The paper introduces a type of thin-film transistor (TFT) that uses aligned arrays of ultrathin ribbons of single crystal silicon for the semiconducting channel. Data show that these devices offer good mechanical

bendability when formed on thin plastic substrates by printing techniques. This capability suggests possible applications in paperlike displays and other flexible electronic devices.

ultrathin ribbons of single crystal silicon for the semiconducting channel."

ST: Could you summarize the significance of your paper in layman's terms?

The results show that well-established inorganic single crystal materials, such as silicon, can be designed into structural forms—i.e., ultrathin ribbons—that enable their use in flexible electronics. This class of material has the potential, therefore, to be used for emerging applications in electronics such as flexible displays, conformable X-ray imagers, and others.

ST: How did you become involved in this research?

We have long standing interests in materials challenges associated with unusual forms of electronics.

If applicable, what are the social or political implications of your research?

A successful outcome would expand the applications of electronics beyond the current wafer and glass substrate-based embodiments into more useful forms that offer lightweight, rugged construction, mechanical flexibility, and other features. These attributes could lead to new, power-efficient electronics and, possibly, improved systems for solar energy conversion. These and other applications could have far reaching implications.

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