CHEMICAL & Engineering News

**Latest News**

**December 19, 2005**
**Volume 83, Number 51**
**p. 13**

**MATERIALS SCIENCE**

# Flexible Silicon

## Processing mistake leads researchers to fabricate ribbons of stretchable silicon

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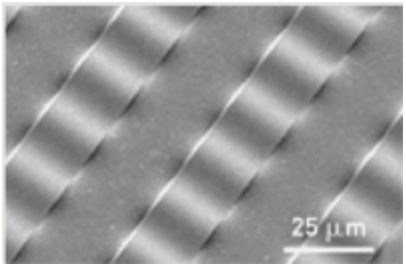


Taking off from a processing mistake made by a student working on a military-funded project to develop flexible, large-area sheets of electronics, materials scientist John A. Rogers of the University of Illinois, Urbana-Champaign, and his colleagues have devised a way to fabricate extra-thin ribbons of silicon that can expand and crumple like an accordion's bellows (*Science*, published online Dec. 15, dx.doi.org/10.1126/science.1121401).

Unlike the flat, brittle silicon on conventional chips, this new form of silicon can flex, bend, and even conform to curvaceous objects like airplane wings and robotic limbs, Rogers says.

"The work opens possibilities, from conformal electronics and devices to new types of sensors and environmentally sensitive processors," comments chemist and materials scientist George M. Whitesides of Harvard University.

To make the stretchable silicon, Rogers and his coworkers first use photolithography to pattern strips of silicon only a few micrometers thick and no wider than a biological cell onto a wafer already topped with an etchable layer of silicon dioxide. Etching that layer away leaves behind silicon strips attached only at the ends to the underlying wafer. Next, the researchers gently stretch a rubbery layer of poly(dimethylsiloxane) atop the strips. Finally, when the researchers peel the elastomer, the silicon strips snap away from the wafer and adhere to the PDMS layer. Meanwhile, the release of strain and concomitant shrinking in the PDMS layer causes the silicon

strips to corrugate with peak-to-peak distances between 5 and 50 Âµm, depending on the thickness of the silicon and the strain in the elastomer.

**Chemical & Engineering News**
**ISSN 0009-2347**