Flexible electronics could find applications as sensors, artificial muscles

(Nanowerk News) Flexible electronic structures with the potential to bend, expand and contract are being developed by researchers at the U.S. Department of Energy's Argonne National Laboratory and the University of Illinois at Urbana-Champaign. These flexible structures find useful applications as sensors and as electronic devices that can be integrated into or biological tissues.

In addition to a biomedical impact, flexible electronics are important for energy technology. Accurate sensors for hydrogen are a key application.

These structures were developed from a concept created by Argonne scientist Yugang Sun and his research team at the University of Illinois led by John A. Rogers. The concept focuses on crystalline semiconductor nanoribbons in stretchable geometrical configurations with specific materials and surface chemistries used in their fabrication and the mechanics of their strains.

Semiconductor ribbons with buckled profiles on polydimethylsiloxane surfaces that are surface chemical bonding exhibit mechanical stretchability. (Image: Argonne National Laboratory)
“We are presently developing stretchable electronics and sensors for smart surgical gl hemispherical electronic eye imagers,” he added.

The team of researchers has been successful in fabricating thin ribbons of silicon and bend, stretch and compress like an accordion without losing their ability to function. These findings were published in the Journal of Materials Chemistry (“Structural forms semiconductor nanoribbons for high-performance stretchable electronics”).

Before coming to Argonne in August of 2006, Sun worked as a research associate und at the University of Illinois at Urbana-Champaign where this project was first initiated. Argonne’s Center for Nanoscale Materials late last year, he was attracted by the facil enhance scientists’ investigations in the properties of materials at nanoscale dimensions.

The Center for Nanoscale Materials at Argonne integrates nanoscale research with Ar capabilities in synchrotron X-ray studies, neutron-based materials research and electr new capabilities in nanosynthesis, nanofabrication, nanomaterials characterization, and simulation.

With the many resources at Argonne at his disposal, Sun plans to expand his research applications in other biological and chemical sensors.

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Source: Argonne National Laboratory