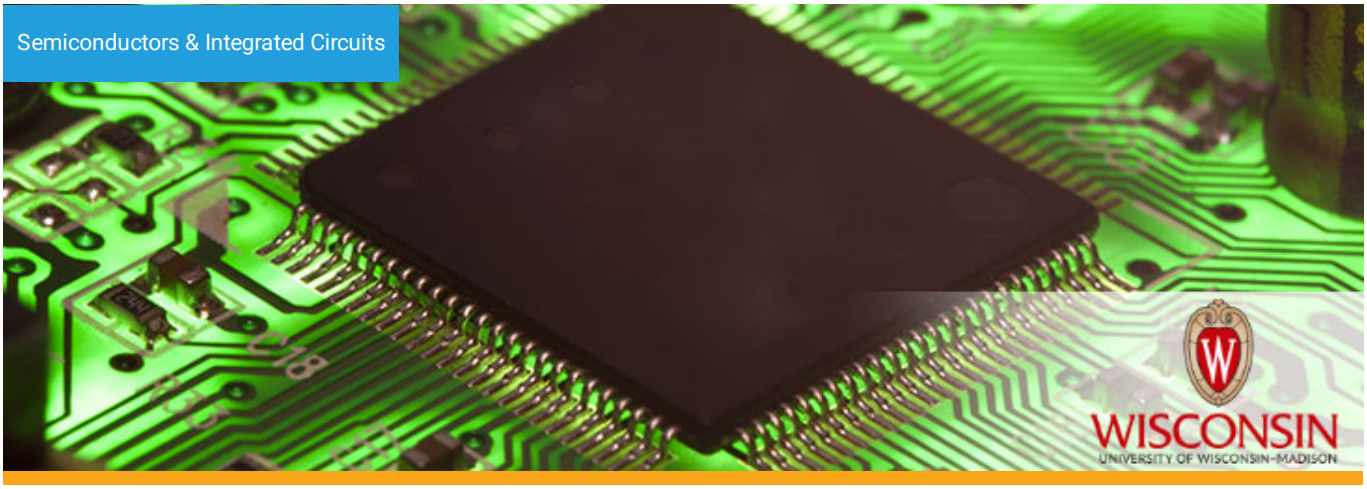

Making Large-Scale Nanopatterned Arrays by Streamlined Roll-to-Roll Printing

View U.S. Patent No. 9,079,351 in PDF format.

WARF: P120088US01

Inventors: Kevin Turner, David Grierson

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a precise and rapid method for transferring nanoscale elements from their manufacturing substrate onto flexible material using a roller apparatus.

Overview

Promising advances in areas like solar cells and photonic crystals are utilizing optical components with nanoscale dimensions. Unique in their ability to collect and manipulate light, these structures are poised to improve energy, communication and information processing capabilities.

Expensive and time consuming fabrication processes, however, remain a key challenge in realizing the full potential of nanoscale optical elements. Typical processes like pick-and-place, used to transfer miniscule elements from the substrate on which they were manufactured to another surface, can cause position errors. A new approach clearly is needed that enables more precise and large-scale imprinting.

The Invention

UW–Madison researchers have developed a roll-to-roll apparatus for transferring large areas of nanoscale elements from their rigid manufacturing surface to a flexible material without spacing errors or damage.

First, a substrate containing the nanopatterned components, such as a stiff wafer, is overlaid with a flexible sheet coated with an adhesive. Rollers convey the sheet across a contacting wheel that presses the sheet and wafer together, lifting and attaching the elements at the area of contact. The method can be performed as a single step or in parallel to move multiple elements at a given time.

Applications

- Roll-to-roll transfer of semiconductors, dielectrics and other metals
- Photonics and electrical component construction

Key Benefits

- Large area and high rate of coverage
- Higher yield and more efficient than existing processes
- Series of wafers can be loaded sequentially, allowing elements of various material to be patterned over large areas in a single substrate.
- Eliminates two-step pick-and-place operation

Additional Information

Related Intellectual Property

- View Divisional Patent in PDF format.

Tech Fields

- Semiconductors & Integrated Circuits : Design & fabrication

For current licensing status, please contact Mark Staudt at mstaudt@warf.org or 608-960-9845