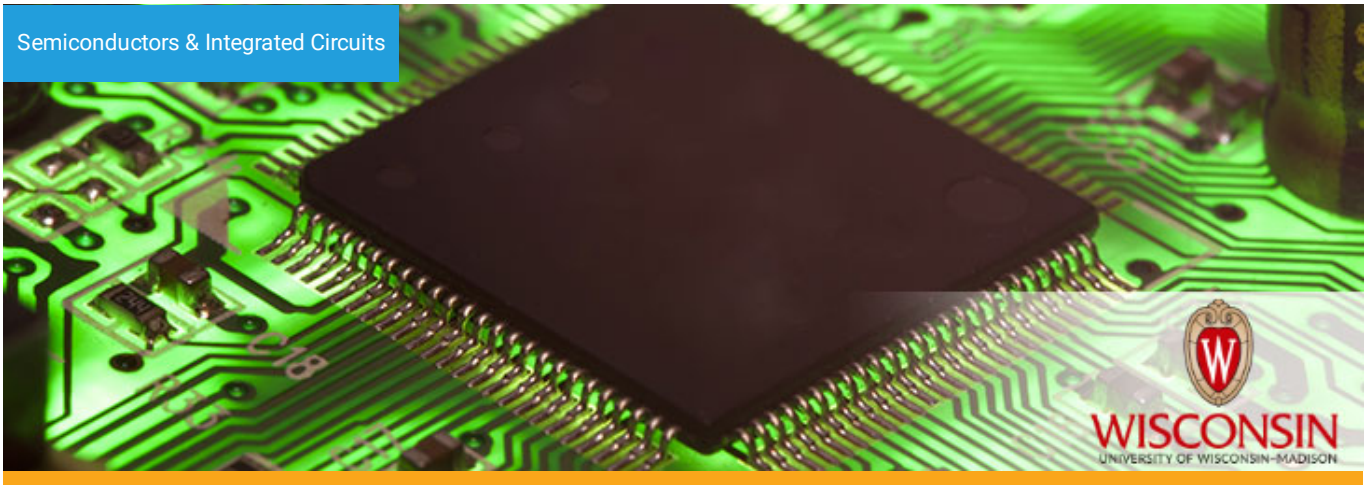

Flexible MOSFET Phototransistors Maximize Light Sensing

View U.S. Patent No. 9,653,640 in PDF format.

WARF: P160090US01

Inventors: Zhenqiang Ma, Jung-Hun Seo

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing thin-film MOSFET phototransistors with improved light absorption and performance.

Overview

Photodetectors convert light signals into electrical signals and are indispensible components in most optoelectronic applications. These devices comprise various designs and materials. In recent years, MOSFETs (metal-oxide semiconductor field-effect transistors) have emerged with many advantages including exceptional photo-sensing capability and responsivity. They also are readily integrated into conventional CMOS chips.

However, several design limitations still need to be resolved. These include structural drawbacks such as light blocking caused by gate electrodes. Also, MOSFETs typically are built on rigid substrates that are difficult to manipulate. Mechanical flexibility can bring design freedom and performance advantages under bending or stretching conditions.

The Invention

UW–Madison researchers have developed an improved MOSFET design based on single-crystalline semiconductor film (or nanomembrane). The thin-film design maximizes light sensing because light is not blocked by any metal layer or component. The use of light reflectors further improves absorption. The new MOSFETs are fabricated on a polymer substrate that is mechanically flexible without degrading performance.

Applications

- High performance flexible optical sensors, photodetectors and CMOS imagers

Key Benefits

- High light sensitivity and stable performance
- Mechanically flexible

Stage of Development

The new MOSFET phototransistors exhibit a maximum responsivity of 52 A/W under blue illumination and photo-to-dark current ratio of more than 105 times under green light illumination.

Additional Information

For More Information About the Inventors

- Zhenqiang Ma

Tech Fields

- Semiconductors & Integrated Circuits : Design & fabrication

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846