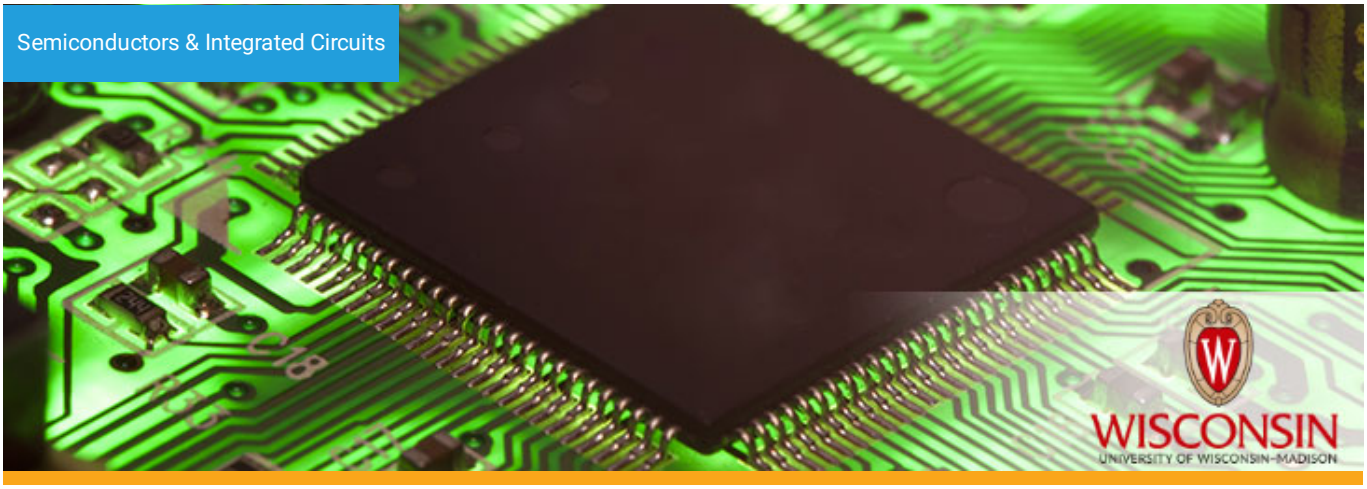
Semiconductors & Integrated Circuits



Epitaxial Growth Of High Quality Vanadium Dioxide Films With Template Engineering

View U.S. Patent No. 9,627,490 in PDF format.

WARF: P160069US01

Inventors: Chang-Beom Eom, Daesu Lee

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing methods of fabricating crack-free VO_2 epitaxial film for use in high speed switches.

Overview

The unique properties of vanadium dioxide (VO_2) lend it to a variety of applications in materials physics and solid-state electronics. Namely it exhibits a sharp metal-insulator transition (MIT) above room temperature, accompanied by a large and ultrafast change of electrical resistance. For this reason $V0_2$, particularly in thin film form, is well suited for use in high speed electronic and optoelectronic switches (e.g., in chemical sensors and memory chips).

However, critical to any practical application for VO_2 is the ability to grow high quality epitaxial films. To date this has been difficult to achieve. Lattice mismatch with the growth substrate causes cracks to form throughout the films and other degradations that compromise reliable device performance.

The Invention

UW–Madison researchers have developed methods of growing high quality VO_2 epitaxial film on an intervening tin oxide (SnO_2) template. The large lattice mismatch between the materials confines structural defects to the interface, while the remainder of the film remains crack- and strain-free. This structural uniformity is highly desirable for creating reliable, high performance devices including high speed switches.

Applications

- Fabrication of VO_2 thin film for use in high speed optoelectronic switches, electronics oscillators, metamaterials, memristive devices, thermal and chemical sensors

Key Benefits

- New method reduces and confines cracks.
- Enables quality films to be grown to commercially practical thickness
- Produces film better able to absorb stresses and strains of MIT
- Should lead to improved and sustained performance

Stage of Development

The development of this technology was supported by WARF Accelerator. WARF Accelerator selects WARF's most commercially

promising technologies and provides expert assistance and funding to enable achievement of commercially significant milestones. WARF believes that these technologies are especially attractive opportunities for licensing.

Additional Information

For More Information About the Inventors

- Chang-Beom Eom

Related Technologies

- See WARF reference number P05036US for information about the researcher's method for fabricating strain-engineered ferroelectric thin films.

Tech Fields

- Semiconductors & Integrated Circuits : Components & materials

For current licensing status, please contact Michael Carey at mcarey@warf.org or 608-960-9867