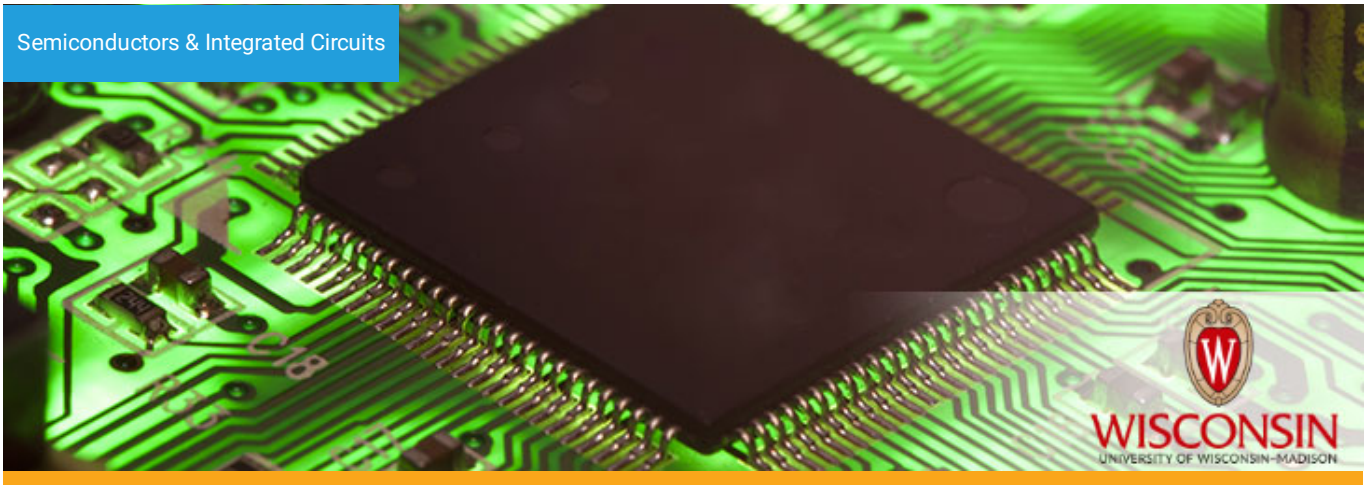
Semiconductors & Integrated Circuits



Improved Method for Making Thin Layers of Crystalline Materials

View U.S. Patent No. 8,492,245 in PDF format.

WARF: P110305US01

Inventors: Max Lagally, Boy Tanto, Deborah Paskiewicz

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method for making templates for the growth of compound semiconductors and other materials.

Overview

Semiconductors are used in the manufacture of many electronic and optoelectronic devices. In particular, compound semiconductors represent a large class of materials with composition ranges that can, in principle, be varied to provide a broad range of lattice parameters. These materials can be grown epitaxially using standard film growth techniques as long as an appropriate growth substrate is available; however, the number of available single-crystalline growth substrates for these materials is very limited. To develop devices created with compound semiconductors, new methods for producing these materials are needed.

The Invention

UW–Madison researchers have developed a method for making templates for the epitaxial growth of compound semiconductors and other materials. The method comprises growing a layer of coherently strained single-crystalline material over a layer of sacrificial material, selectively removing the one or more suspended sections of the layer of sacrificial material and detaching the one or more elastically relaxed portions of the layer of single-crystalline material from the remainder of the layer of single-crystalline material. The semiconductor alloy described is $Si_{1-x}Ge_x$, where x is at least 0.2.

Applications

- Various electronic, optoelectronic and thermoelectric applications
- Quantum computing, quantum electronics or spintronics

Key Benefits

- Method is generally applicable to compound semiconductors.
- Provides defect-free compound-semiconductor thick and thin films
- Thick strain-free growth templates can be fabricated.
- Could serve as a new substrate for the growth of defect-free strained heteroepitaxial materials
- For Group-IV semiconductors, expands the range of materials that can be grown on the strain-free SiGe substrate
- SiGe has better light absorption properties than Si alone.
- Provides better substrates for Group-IV quantum cascade lasers

Additional Information

For More Information About the Inventors

- Max Lagally

Related Technologies

- See WARF reference number P04286US for a method of creating a strained layer of silicon.
- See WARF reference number P06013US for an improved method for the manufacturing of quantum-well photoelectric devices.

Tech Fields

- Semiconductors & Integrated Circuits : Components & materials

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