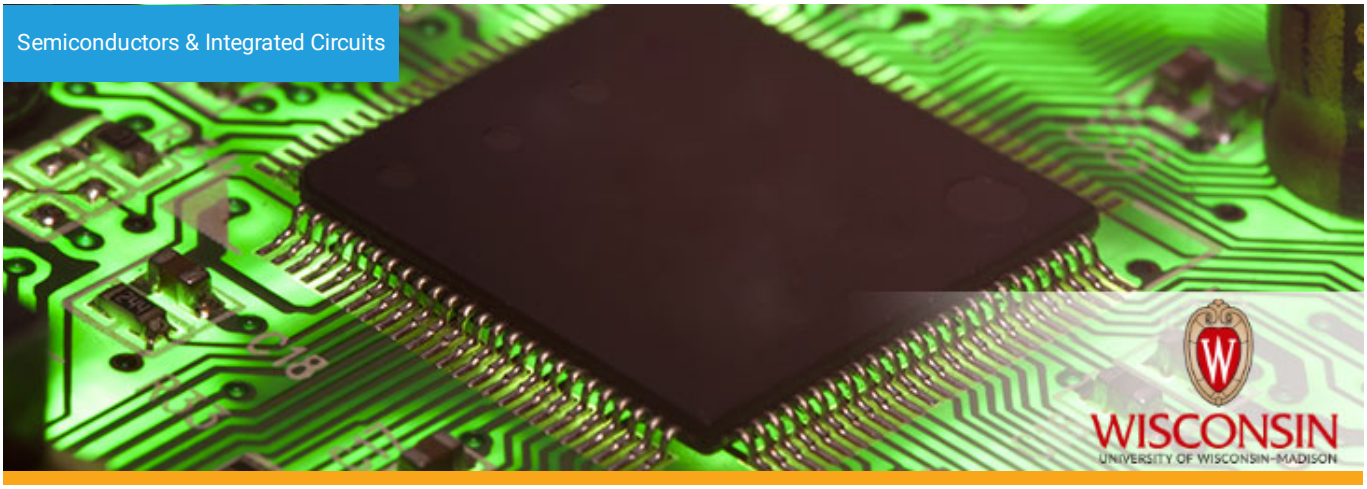


# Silicon-Based, Single Electron Transistor

View U.S. Patent No. 6,946,693 in PDF format.

**WARF: P04130US**

Inventors: Robert Blick, Dominik Scheible

**The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a silicon-based, single electron transistor that consists of a source, drain and island.**

## Overview

Because today's transistors transfer millions of electrons at a time, they generate a large amount of heat when packed together on semiconductor chips. As a result, chips can only contain a set number of conventional transistors. The use of a single electron transistor (SET) would overcome this limitation.

## The Invention

UW-Madison researchers have developed a silicon-based, single electron transistor that consists of a source, drain and island. The SET's island is composed of a pillar of material that can be biased from the source side, where it collects an electron, to the drain side, where it passes off the electron using the electron's inherent resonant frequency. It holds many benefits over currently envisioned SET devices, making it feasible for commercial applications such as switches and signal filters.

## Applications

- May be incorporated into circuit elements, rectifiers, transistors and gas and radiation sensors

## Key Benefits

- Works at room temperature, unlike many current technologies
- Pillar has a fundamental lateral vibration mode with a resonant frequency in the range of 10 MHz to 1 GHz or potentially even greater.
- Formed by conventional semiconductor manufacturing processes without using a sacrificial layer
- Can be formed to have a very small footprint, allowing dense packing of these structures in an array

## Additional Information

**Related Intellectual Property**

- View Continuation Patent in PDF format.

**Publications**

- Blick R.H. and Scheible D.V. 2004. Silicon Nano-Pillars for Mechanical Single Electron Tansport. Appl. Phys. Lett. 84, 4632-4634.

**Tech Fields**

- Semiconductors & Integrated Circuits : Components & materials

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854