Patented process builds better semiconductors, improves electronic devices

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Jim Edgar, university distinguished professor of chemical engineering at Kansas State University, has received a patent for his process that can build better semiconductors and improve electronic devices. Credit: Kansas State University

Through a surprise research discovery, a Kansas State University chemical engineer has found the icing on the cake for electronic devices.

Jim Edgar, university distinguished professor of chemical engineering,

has received a patent for his invention "Off-axis silicon carbide substrates," which is a process for building better semiconductors.

The research may help improve electronic devices and could benefit the power electronics industry and manufacturers of semiconductor devices.

Electronics are made of semiconductors crystals that must be layered perfectly for the electronic device to work.

"It's like a stacked cake separated by layers of icing," Edgar said. "When the layers of semiconductors don't match up very well, it introduces defects. Any time there is a defect, it degrades the efficiency of the device."

Edgar's research has developed a better way to build semiconductors and layer them to minimize potential defects—an important discovery for manufacturers.

Edgar describes the research discovery as serendipitous. Several years ago, when Yi Zhang, a 2011 doctoral graduate in chemical engineering, was working in the laboratory, she found a substrate sample that was very smooth.

Collaborative researchers at the State University of New York at Stony Brook and the University of Bristol in the United Kingdom later confirmed the layer's presence and proved that it had fewer defects than on the standard substrate.

"We have applied this process to other systems," Edgar said. "We are working on verifying that it is not just these specific materials we started with, but that it can be applied to a lot of different materials."

Some of Edgar's latest research focuses on two different boron

compounds: boron phosphide and icosahedral phosphide.

Provided by Kansas State University