



# University of Central Florida

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## Selective Backside Processing of Materials Including Silicon Semiconductors

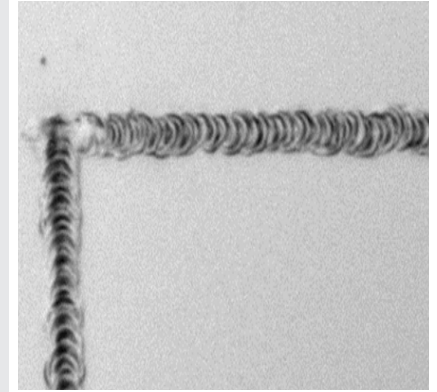
Semiconductors are at the core of nearly every system of modern technology, and their ability to power ever-more-compact electronics depends on advances in manufacturing processes like patterning and welding. Conventionally, processing of double-side semiconductors calls for flipping the wafer to pattern the backside. Now, researchers at UCF have developed a method capitalizing on silicon's transparency at 2  $\mu\text{m}$  to machine the backside surface without affecting the top surface. This combined with the ability to process the front surface provides a single tool that can process the front and back surface of silicon, reducing equipment cost and processing time. The new method can also be used to remove metal coating from silicon, especially useful in the manufacturing of photovoltaic (PV) solar cells. Selectively processing silicon holds promise in welding applications, for material combinations like silicon to aluminum where laser welding is not possible using a wavelength absorbed by the semiconductor or obscured by the metal.

### Technical Details

The inventors have successfully applied pulsed 2  $\mu\text{m}$  thulium fiber lasers in silicon's transparency spectral range, to selectively machine the back surface of 500- $\mu\text{m}$  thick double-side polished silicon wafers without causing damage to the front surface. The materials processing method comprises a pulsed laser output beam of 200 to 300  $\mu\text{J}$  in 7 ns FWHM, where the photon energy is less than the bandgap energy of the silicon. Material processing is then performed using a computer controlled stage to process the material as required.

### UCF Inventors

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### Benefits

- Laser processing of silicon through the material, affecting the backside with no damage to the front

### Applications

- Materials processing:
  - Silicon semiconductors
  - Photovoltaic (PV) solar cell manufacturing
  - Microelectronics manufacturing
  - Packaging

### Tech Fields

Optics and Lasers, Semiconductors

### Keywords

silicon semiconductors, materials processing, patterning, machining, thulium fiber lasers, photovoltaic, PV, solar, microelectronics, manufacturing

### Patent Application Pub. No

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**If you or your company are interested in this opportunity, Contact:**

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