

## A More Cost-Effective Method for Manufacturing Solid Oxide Cells

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**Categories:**

- Materials and Manufacturing
- Micro & Nanotechnologies

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- Electrical conductivity
- Energy
- Fuel Cells
- fuels

Solid oxide cells (SOCs) are electrochemical devices that can transform chemical energy into electrical energy. Depending on their use, they can be solid oxide fuel cells (SOFCs) or solid oxide electrolysis cells (SOECs). Typical structure configuration includes planar structure in which an electrolyte layer is sandwiched between two electrode layers. During operation of the cell at elevated temperatures, one electrode is in contact with oxygen or air, and the other is in contact with a fuel gas. The cell layers are generally made by tape casting and then dried and sintered. The conventional sintering places the green tapes in a furnace and heats for hours. The process consumes a significant amount of time and energy. The cell is limited to a small size as the uneven temperature field in a furnace leads a larger size to crack.

Researchers at Purdue have developed a technology that allows for quicker and more cost-effective sintering of SOCs. This technology uses an apparatus for the measurement of temperature of a heating stage connected to electrodes for easy modification from a power source. The temperature controller, which is linked to a data processor, can adjust the power supply based on the output temperature value, thereby regulating the temperature of heating stage. Application of this technology will allow for the development of cheaper and more robust SOCs with an increase in sample size as well as a decrease in the use of energy required for formation.

**Technology Validation:**

- Sintering full cells within a short duration of time

**Advantages:**

- Significantly less time and energy consumption compared to conventional furnace sintering
- Increased size of full cells compared to conventional furnace sintering

**Applications:**

- Solid Oxide Fuel/Electrolysis Cells

**People:**

- Xie, Yi (Project leader)

**Intellectual Property:**

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**Contact OTC:**

Purdue Office of Technology Commercialization  
The Convergence Center  
101 Foundry Drive, Suite 2500  
West Lafayette, IN 47906

Phone: (765) 588-3475

Fax: (765) 463-3486

Email: [otcip@prf.org](mailto:otcip@prf.org)