Three Dimension (3D) Single Chamber Fuel Cell

Technology #12417

Applications

Three dimension single chamber fuel cells (3DFC) can be used for mobile or stationary power applications (e.g. electric vehicles or power grid storage) designed for solid oxide fuel cells (SOFCs).

Problem Addressed

SOFCs require complete separation of fuel and oxidant gases into gas-tight chambers as the electrodes are catalytically active but chemically non-selective. Recently, single chamber solid oxide fuel cells (SCFCs) have been realized through chemically selective catalysts capable of operating under the same fuel+oxidant gas mixture for both the anode and cathode. However, high flow rates and poor fuel utilization lower the overall efficiency of SCFCs. This technology utilizes a catalytic converter (CAT), which converts pollutants in internal combustion engines into more benign gases, combined with the power generation capabilities of the SCFC to create a three-dimensionally distributed fuel cell.

Technology

This device uses the demonstrated operating principles of the SCFC with enhanced fuel utilization and mechanical robustness of the catalytic converter to create high voltage and power fuel cells (scalable from >1W to several kW). The 3DFC differs from SCFCs through the creation of stack components. The stacks are positioned directly in the fuel+oxidant gas flow in a grid/array pattern that is optimized in configuration to increase fuel+oxidant mixing and improve the reaction zone distribution throughout the 3DFC. This pattern leads to higher fuel cell efficiency. The materials used consist of the typical perovskite structure, transition metals, noble metals and fluorite structure that are currently used in SOFC devices.

Advantages

- Increases thermal/mechanical stability of entire fuel stack
- Improves cycling performance of system
- Flexibility in design and integration

Categories For This Invention:

Energy
Fuel Cells

Intellectual Property:

Three dimensional single-chamber fuel cells

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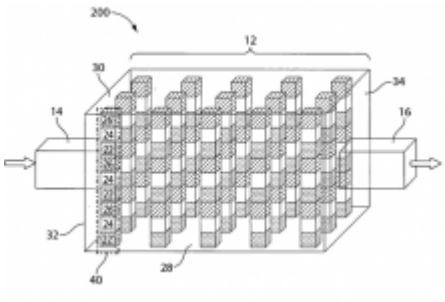
Image Gallery:



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