Status of SOFC Stack Technology at NexTech Materials

NexTech Materials is developing planar SOFC stack technology based on its enabling *FlexCell* design. The *FlexCell* is an electrolyte-supported planar element based on a two-layer structure comprising a thin electrolyte layer that is mechanically supported by a "honeycomb" mesh layer of electrolyte material. The FlexCell design provides several important attributes. Thin anode layers of the *FlexCell* enable high single-pass fuel utilization, without sacrificing performance. Electrode materials flexibility of the *FlexCell* platform makes it easy to incorporate new and improved electrode materials as they are developed, for example anodes that are extremely resistant to poisoning by sulfur impurities when infrastructure fuels are used. Another key advantage of the *FlexCell* design is that there is no intrinsic limitation to the size of cells that can be made. NexTech has fabricated *FlexCells* with total area of 1200 cm^2 and active area of 800 cm^2, and demonstrated more than 400 watts of power from these large area cells under high fuel utilization conditions.

A current focus of work at NexTech is on stack design, fabrication and testing. NexTech's modular stack design exploits the attributes of the *FlexCell* architecture and provides a path to achieving high gravimetric and volumetric stack power densities. The stack design capitalizes on the mechanical flexibility and strength of the *FlexCell* and the gasketed sealing approach afforded by the dense cell perimeter. The bulk of NexTech's stack development work to date has focused on 500-watt stack modules (which ultimately would be combined into stacks scaled for up to 3 kW of power). This work has proven the salient features of NexTech's stack design and validated the materials selection decisions that have been made. NexTech also has initiated development of 5-10 kW scale stacks, leveraging the aforementioned size scalability of *FlexCell* membranes.

This poster will describe cell-level demonstrations of the unique attributes of the *FlexCell* design as well as the status of SOFC stack development work at NexTech.

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