Solid Oxide Fuel Cell Development at Topsoe Fuel Cell A/S and Risø National Laboratory -

The consortium of Topsoe Fuel Cell A/S and Risø National Laboratory has up-scaled its production capacity of anode-supported cells to about 1100 per week. Stacks are based on a compact thin plate multilayer design with metallic interconnects and 12x12 cm(2) or 18x18 cm(2) foot print. Larger (500 cm(2)) cells are currently under evaluation. Stacks have been tested successfully for more than 13000 h. Several 50 or 75 cell stacks in the 1+ kW power range have been tested successfully at a fuel utilisation of up to 92%. Multi stack modules consisting of four 75 cell stacks have been tested for more than 4000 h with pre-reformed natural gas and modules consisting of twelve stacks are under development. The degradation rate has been reduced to below 0.5% per 1000 h, especially by improvement of metal alloy interconnects and coatings. Our SOFC program comprises development of next generation cells with metallic support for operation at lower temperature. In this case porous ferritic steel is used as a cheap, ductile, robust cell support and the electrolyte is based on scandia-stabilized zirconia with improved durability. Furthermore, the metal supported cells offer a significantly improved tolerance towards redox cycling. In collaboration with Wartsila, a 24-stack prototype based on natural gas is being tested. For methanol based systems the methanol is methanated upstream the anode using a newly developed proprietary Haldor Topsoe catalyst. The range of fuels have further been extended to include ethanol and coal syngas by development of a new coke resistant catalyst suitable for future SOFC technology.

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