PolyFuel sets new record for portable fuel cell performance

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PolyFuel, a developer of engineered fuel cell membranes, announced today that it has developed a new, ultra-thin membrane capable of delivering nearly 1.4 times the power density of any fuel cell membrane currently available.

The new 20-micron hydrocarbon membrane, when used in direct methanol fuel cells (DMFC) being developed for micro power applications such as notebook computers and cell phones, produces an unprecedented 200 milliwatts of peak power per square centimeter of material at 70C. This level of power will allow a significant reduction in the size, weight and cost of the fuel cell "stack," which is a key component of the fuel cell system. These compact fuel cell power supplies are being developed by leading manufacturers to deliver the extended runtimes that consumers desire from their portable electronic devices.

Fuel cell membranes, often called the "heart of the fuel cell," allow an electrochemical reaction to occur that generates electricity directly from a solution of fuel – in this case a combination of readily-available methanol – and water. Previous records in this area were set by another PolyFuel hydrocarbon membrane of 45 microns thickness, from which 140 milliwatts of peak power per square centimeter was obtained at similar conditions. Other materials, such as fluorocarbon membranes – considered by many to be at their "end of life" stage – have not been able to demonstrate such high power while maintaining acceptable efficiencies.

This new membrane also allows more than twice the amount of water to diffuse through it than previous membranes, which simplifies the design of the fuel cell. During operation, water in the fuel-water solution is consumed in the electricity generating reaction on one side of the membrane (the anode) and reappears as a by-product on the opposite side of the membrane (the cathode). PolyFuel's 20-micron membrane allows the water to diffuse back from the cathode to the anode, where it can participate again in the reaction. This "molecular-level recycling" can eliminate the need for pumps and other components of water recovery systems, which are especially problematic in products intended for smaller applications such as cell phones or PDAs.

Samsung engineers indicated recently that the new membrane is a breakthrough from their perspective. They recently conducted a rigorous series of tests on every fuel cell membrane that they could find, and PolyFuel's 20 micron material outperformed all of the others in terms of its combination of power and efficiency. Samsung is among the leaders in consumer electronics in trying to find alternatives to extend the runtime for portable electronic devices, which, with the rapid rise in consumer-demanded features such as video, are becoming increasingly power hungry – beyond the capabilities of even the best available batteries.

The unfavorable publicity that lithium-ion batteries have recently received due to ignition whilst in use in laptops; and the resultant high-profile product recalls are only hastening the search for alternative long runtime power supplies. Micro power fuel cells are viewed by many as the best, and increasingly viable, solution.

Said one of Samsung's Principal Engineers, "A fuel cell can never deliver too much power, or be too efficient. We expect that the new material, plus the strong support that PolyFuel is providing, will enable us to achieve a new performance milestone."

Jim Balcom, Chief Executive Officer of PolyFuel, commented: "The characteristics of PolyFuel's hydrocarbon membrane chemistry allow for significantly improved flexibility in the design of portable fuel cells. One of the most requested features has been for a thinner membrane that retains PolyFuel's excellent methanol crossover, water crossover and durability characteristics, while meeting aggressive, new fuel cell performance targets. We are pleased that we have been able to engineer a specific membrane to meet these requests."