3M Reports 'Striking Results' in Development of Nanostructured Thin Film Catalyst to Boost Fuel Cell Power in Vehicular Application

In a presentation at the annual Fuel Cell Seminar, held here this week, 3M today reported "striking results" in improving the durability of catalysts for proton exchange membranes (PEMs) without compromising performance, which is regarded as an essential development to enable the widespread use of fuel cells in vehicles. The presentation was titled, "High Voltage Stability of Nanostructured Thin Film Catalysts for PEM Fuel Cells."

Dr. Mark Debe, 3M senior staff scientist, described how significantly improved performance has been achieved by coating membranes with a submicron monolayer catalyst (3M's NSTF) that sharply reduces the loss of surface area under repetitive high-voltage cycling. The nanostructured thin film catalyst also completely eliminates carbon corrosion effects at high potentials, and any subsequent loss of catalyst surface area, catalyst activity and fuel cell performance.

In addition to Dr. Debe's presentation, 3M also is presenting posters on "MEA (Membrane Electrode Assembly) Accelerated Testing and Modeling,"and "Ex-Situ and In-Situ Stability Studies of PEM Fuel Cell Catalysts: The Effect of Carbon Type and Humidification on the Thermal Degradation of Carbon-Supported Catalysts."

3M is a leading manufacturer of fuel cell components, including MEAs. Its fuel cell research and development (R&D) projects are directed primarily toward overcoming technical impediments to the adoption of hydrogen fuel cells as primary power sources for autos, buses and trucks. At last year's Fuel Cell Seminar, 3M reported on its new gas diffusion layer membrane architecture, which improves MEA durability by increasing resistance to oxidation.

"It's very much an incremental process, but steady progress is being made industrywide toward the application of hydrogen fuel cells as a practical alternative to fossil fuel power for transportation," says Michael Lynn, manager, 3M Commercialization Services. "We can't predict exactly when that goal will be realized, but it's certainly within the foreseeable future."

Lynn notes that hydrogen fuel cells already are serving in a growing capacity as backup power sources in certain industries, especially telecommunications. "As the technology improves, the range of applications will become almost as unlimited as is our source of hydrogen," he observes.

3M's strength in materials R&D has allowed the company to commit a full range of its core competencies and technology platforms to its fuel cell program, including fluoromaterials/polymers, adhesives, microreplication, and porous materials and membranes, in addition to the previously mentioned technologies.

"MEAs are critical subsystems within a fuel cell, and they have many subcomponents," Dr. Lynn explains, adding that 3M's core materials and processing technologies enable the company to provide customized, fully-assembled MEAs designed to a client's requirements, and engineered for high-volume manufacturability and integration into the customer's assembly process."

3M's state-of-the-art testing facility analyzes MEAs to ensure that components are leak free, have no electrical shorts, can tolerate tight dimensions, perform to the highest expectations and exhibit durability.

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