

University-industry alliance to advance Virginia Tech fuel cell discoveries

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Virginia universities will partner with Battelle and other industry partners, Virginia's Center for Innovative Technology, and Los Alamos National Laboratory to build upon Virginia Tech discoveries in a program called "Bridging the Gap Between New Materials, [Fuel Cell Devices and Products](#)."

James McGrath of Blacksburg, University Distinguished Professor of Chemistry, and Virginia Tech Provost Mark McNamee of Blacksburg have been awarded a two-year, \$600,000 National Science Foundation Partnership for Innovation (PFI) grant to support the program.

The award is McGrath's second PFI. The Materials Research Institute, which McGrath headed for 17 years, also received a two-year \$600,000 grant in 2001 to develop efficient inexpensive fuel cell materials. "This time, the National Science Foundation wants to see the new science and technology more widely applied," McGrath said. "Our proposal outlined a plan for that next step. Virginia Tech will work with Battelle, Los Alamos National Laboratory, Virginia's Center for Innovative Technology, several companies, and Virginia Commonwealth University to bridge gaps in materials, processes, and test methodologies."

Battelle, which manages several Department of Energy national laboratories, including Los Alamos National Laboratory, Pacific Northwest, and Oak Ridge, has an exclusive option from Virginia Tech Intellectual Properties Inc. to identify potential national and international markets for new fuel cell membrane technologies.

Faculty members and students in Virginia Tech's Materials Research Institute have developed and patented new inexpensive, efficient copolymeric materials for use in fuel cells and processes for creating the materials. Fuel cells have the potential to supply clean energy for cars, homes, and portable electronics. A limiting features are the characteristics of polymeric materials used in the proton exchange membrane (PEM) film. The PEM allows hydrogen protons (H^+ ions) to pass through to the oxygen side of the fuel cell, where it can release electrochemical energy by reaction with the oxygen. The McGrath group has developed polymeric films that are viable in high heat environments, conductive, and strong enough to be used as advanced materials in fuel cells. They have created a process that incorporates the ion conductor at the monomer level (initial stage of synthesis) rather than after the polymer has been formed, making the materials more durable and easier to create in a scaled-up manufacturing setting. Battelle has extended its option on the patents until March 2005.

The PFI plan also calls for sharing information on the transition from the laboratory to full-scale production of the fuel cell materials. There have already been discussions with the GM fuel cell materials group in Rochester, N.Y., Motorola in Tempe, Ariz., United Technologies Fuel Cells of Hartford, Conn., and Teledyne Energy Systems of Los Angeles, which have shared testing protocols for automotive, portable, and stationary power applications. "Our plan is, with Battelle's guidance, to interact with small and large companies which are interested in our film forming materials, and then follow up on their suggestions and requests," McGrath said.

The Center for Innovative Technology will promote workforce development in Virginia by increasing the Virginia technology community's awareness of the fuel cell PFI, and by identifying opportunities for partnering with existing and start-up corporations within the state. Hydrosize Technologies Inc. of Raleigh, N.C., has

already scaled up production of several of the PEM materials to kilogram quantities and the Polymer Technology Group Inc. group in Berkeley, Calif., has successfully developed continuous film casting capabilities. Nanosonic Inc. of Blacksburg is investigating some portable power applications of the new PEM material.

In his role as co-principal investigator on the grant, McNamee will provide leadership in organizing an annual open forum highlighting progress in the National Science Foundation fuel cell PFI effort as part of the Virginia universities' role in economic development. It is planned that the audience will include members of the Virginia General Assembly, Virginia members of Congress, large and start-up corporations in the commonwealth, and the investment community.

Other Virginia Tech researchers who will be active in the PFI are Michael von Spakovsky of Blacksburg, professor of mechanical engineering and director of the Center for Energy Systems Research, and Judy Riffle of Blacksburg, professor of chemistry and director of the Macromolecular Science and Engineering graduate degree program.

The researchers expect they will have a National Science Foundation research experience for undergraduates (REU) program as part of the PFI by next summer. "We were able to have an REU as part of the previous PFI," McGrath said.

Source: Virginia Tech

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