WVU team aids in development of new electroplating method

Process can help cut costs on energy

Submitted to The Dominion Post

A manganese-cobalt coating developed by researchers at WVU and the Department of Energy's National Energy Technology Laboratory will help keep a potential new energy source cheap, efficient and clean.

Xingbo Liu, a mechanical and aerospace engineering assistant professor in WVU's College of Engineering and Mineral Resources, led a team that developed a new electroplating that makes connecting multiple solid oxide fuel cells — SOFCs — more efficient.

Xingbo Liu

WVU and NETL researchers are partnering with the Department of Energy's Solid State Energy Conversion Alliance program, which is funding the project. The program is developing SOFCs to operate using coal-based power. One source is coal syngas, a fuel produced from coal gasification.

Liu explained that SOFCs produce electricity by oxidizing fuels like coal syngas, but a single cell produces only one volt. For practical applications, SOFCs are typically "stacked" using interconnects to generate power enough for electricity-generating plants. The latest WVU/NETL innovation makes those interconnects feasible.

"The cells can be used for a variety of purposes, from providing power for equipment a soldier might use and running vehicles to powering a household or a typical power plant that generates electricity," Liu said. "The coating supports fuel-cell technology which is the basis for the 'hydrogen economy' of the future."

Curt M. Peterson, WVU vice president for research and economic development, sees the innovation as having implications for the West Virginia economy.

"The research by Dr. Liu and his team at WVU and NETL is important on an international scale but particularly important to West Virginia," he said. "The abundance of coal in our state positions us to be a global catalyst for a new, sustainable energy source. It will also significantly bolster the economy both at a state and national level as the development of SOFCs and related technology continues."

Operating at 800 degrees Celsius, the manganese-cobalt plated interconnects not only protect the SOFCs from corrosion, but are also cleaner and more cost-efficient than previous coatings that used hazardous chemicals.

"We have already field tested the interconnects," Liu said."We're the first group to successfully field test and prove the plated manganese-cobalt coating will work. Our plating is less expensive to produce, and production is less hazardous to the environment than previous plating. The chemicals we use don't pose waste disposal problems like other plating."

Along with Liu, team members from WVU's Department of Mechanical and Aerospace Engineering include Chair Ever Barbero, postdoctoral fellow Ying Lu Jiang and doctoral student Junwei Wu. Their partners at NETL are Randall Gemmen, Christopher Johnson and Ayyakkannu Manivannan.

The work of Liu's team has been published in professional journals, including *Journal of Power Sources, International Journal of Hydrogen Energy* and *Electrochimica Acta*. The team has filed for a patent on the technology.