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A High Temperature-Stable Derivative of Anhydrous Phosphoric Acid

AzTE Case # M12-158P

Inventors

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Background

Hydrogen-oxygen fuel cells require an electrolyte that allows positively charged ions to pass from the anode to the cathode. Phosphoric acid is used in either liquid or membrane forms as an electrolyte and is stable to temperatures of 160°C. Above that temperature the compound breaks down causing loss of conductivity.

Higher operating temperatures allow fuel cells to operate more efficiently. Power density increases with efficiency which allows more electricity to be generated by smaller fuel cells.

In 2012 worldwide sales of fuel cells and hydrogen reached $785 million dollars. The industry is growing rapidly and analysts predict sales will reach $28 billion dollars by 2017.

Invention Description

Researchers at Arizona State University have developed a novel electrolyte that works in hydrogen-oxygen fuel cells. The electrolyte increases operating temperatures to 285°C with improved conductivity over standard phosphoric acid electrolytes. The material can be manufactured to meet the needs of fuel cells requiring either liquid or membrane electrolytes.

This innovation allows for the development of new, more powerful stationary fuel cells, lower cost smaller fuel cells, and can be use as a replacement for Phosphoric Acid Electrolytes used in existing hydrogen-oxygen fuel cells.

Potential Applications

- Provides low cost power in remote areas currently without electricity.
- Allows building owners to reduce their power costs by providing low cost electricity and heat in co-generation applications.
- Provides a higher energy density allowing for smaller and lighter emergency backup power applications.

Benefits and Advantages

- **Higher Operating Temperatures** – Provides higher power density at low cost.
- **Stability** – Electrolyte provides superior conductivity across the temperature spectrum.
- **Flexibility** – Product can be sold in liquid form or as a membrane.

Intellectual Property Status:

Patent Pending

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