fine water mist regardless of gravity or system orientation.

When the system is operated, the gas pressure forces the liquid from the extinguisher. The gas and liquid constituents are also mixed to deliver a multiphase flow to the discharge nozzle to generate fine water-mist droplets, which extinguish the fire.

This work was done by James R. Butz, Craig S. Turchi, and Amanda Kimball of ADA Technologies Inc. and Thomas McKinnon and Edward Riedel of Colorado School of Mines for Glenn Research Center.

Inquiries concerning rights for the commercial use of this invention should be addressed to ADA Technologies Inc, Attn: Nick Knowlton, 8100 Shaffer Pkwy, suite 130, Littleton, CO. 80127-4107, (303) 874-7377. LEW-18190-1

Fuel-Cell Water Separator

Separator uses no moving parts or other power-consuming components.

John H. Glenn Research Center, Ohio

The main product of a typical fuel cell is water, and many fuel-cell configurations use the flow of excess gases (i.e., gases not consumed by the reaction) to drive the resultant water out of the cell. This two-phase mixture then exits through an exhaust port where the two fluids must again be separated to prevent the fuel cell from flooding and to facilitate the reutilization of both fluids.

The Glenn Research Center (GRC) has designed, built, and tested an innovative fuel-cell water separator that not only removes liquid water from a fuel cell's exhaust ports, but does so with no moving parts or other power-consuming components. Instead it employs the potential and kinetic energies already present in the moving exhaust flow. In addition, the geometry of the separator is explicitly intended to be integrated into a fuel-cell stack, providing a direct mate with the fuel cell's existing flow ports. The separator is also fully scalable, allowing it to accommodate a wide range of water removal requirements. Multiple separators can simply be "stacked" in series or parallel to adapt to the water production/removal rate.

GRC's separator accomplishes the task of water removal by coupling a high aspect-ratio flow chamber with a highly hydrophilic, polyethersulfone membrane. The hydrophilic membrane readily absorbs and transports the liquid water away from the mixture while simultaneously resisting gas penetration. The expansive flow path maximizes the interaction of the water particles with the membrane while minimizing the overall gas flow restriction. In essence, each fluid takes its corresponding path of least resistance, and the two fluids are effectively separated.

The GRC fuel-cell water separator has a broad range of applications, including commercial hydrogen-air fuel cells currently being considered for power generation in automobiles.

This work was done by Kenneth Alan Burke, Caleb Fisher, and Paul Newman of Glenn Research Center. Further information is contained in a TSP (see page 1).

Inquiries concerning rights for the commercial use of this invention should be addressed to NASA Glenn Research Center, Innovative Partnerships Office, Attn: Steve Fedor, Mail Stop 4–8, 21000 Brookpark Road, Cleveland, Ohio 44135. Refer to LEW-18304-1.