



Robust, Piezoelectrically Actuated High Flow Range Microvalve for Liquid/Gas

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a high flow range microvalve that uses a piezoelectric actuator and nesting valve elements to control the flow of a liquid or gas.

Overview

Compact, electrically actuated valves may be used in applications ranging from drug delivery to metering cryogenic gases in cooling systems for space missions. Such valves must be highly reliable, energy efficient and resistant to temperature extremes and environmental contaminants. Piezoelectric actuators use an electric field to elicit a shape change in a solid.

The Invention

UW-Madison researchers have developed a high flow range microvalve that uses a piezoelectric actuator and nesting valve elements to control the flow of a liquid or gas. In this invention, electronically controlled piezoelectric actuators can cause a silicon micro-machined wafer to flex, and to press onto a complementary glass substrate, applying a very high force. This creates a valve-closing seal with electronic control that withstands high pressure. Large flow modulation is achieved by correctly engineering the perimeter of the valve seat.

Applications

- Refrigeration in space missions
- Control of cryogenic fluids
- Joule-Thomson refrigeration
- Circuits with heat exchangers
- Drug delivery

Key Benefits

- Compatible with valve-integrated pressure and temperature sensor technology
- Able to withstand rapid pressure and temperature changes
- Consumes negligible power
- Provides a high flow range
- May be powered by batteries with direct current
- Operates at cryogenic temperatures and high pressures
- Open design allows for use of pressurized reservoir and eliminates need for a pump

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Additional Information

For More Information About the Inventors

- [Gregory Nellis](#)

Tech Fields

- [Analytical Instrumentation, Methods & Materials : Microfluidics](#)

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846

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