



# Technology Opportunity

## Measuring Liquid Metal Flow Rates with an Optical Hotspot Conductive Sensor

Scientists at NASA's Marshall Space Flight Center have patented an improved version of the Hotspot Conductive Fluid Flow Sensor to measure the flow rate of electrically conductive liquid. The original technology, developed for use in a solid fuel bismuth hall thruster, uses a heat pulse technique in which a thermal spike, or "hotspot," is introduced into the liquid flow. The improved technology uses an optical sensor to detect the thermal spike and is less intrusive, less potentially contaminating, and less susceptible to electromagnetic interference than the previous approach. The invention is especially well suited for measuring very low flow rates of approximately 1 to 30 milligrams/second and provides a measurement accuracy of 1 percent.

## Benefits

- **Low flow rates:** Accommodates flows from 1 to 30 milligrams/second
- **Precise:** Provides measurement accuracy of 1 percent or as low as 0.01 milligrams/second
- **Rugged:** Prevents a larger amount of electromagnetic interference than previous technology
- **Fast:** Offers a millisecond response time, providing good resolution for the fluid flow rates, measured in seconds

## Commercial Applications

- Propulsion bismuth hall thrusters
- Metallurgy and industrial metal alloys
- Solder jetting
- Molten tin jetting
- Device cooling
- Low flow of alkali and other toxic metals

## Licensing and Partnering Opportunities

This technology is part of NASA's technology transfer program. The program seeks to stimulate development of commercial uses of NASA-developed technologies. NASA is flexible in its agreements, and opportunities exist for licensing and joint development. MSFC is interested in a partnership to commercialize the technology.

## Patents

U.S. Patent Number: 7,409,875

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