Technology Commercialization Opportunity

MVS - Miniaturized Viscosity Sensor

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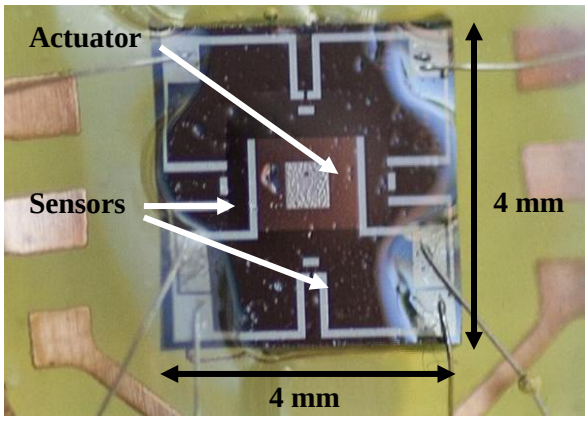
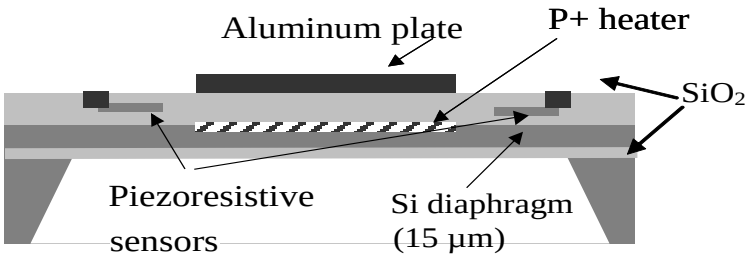
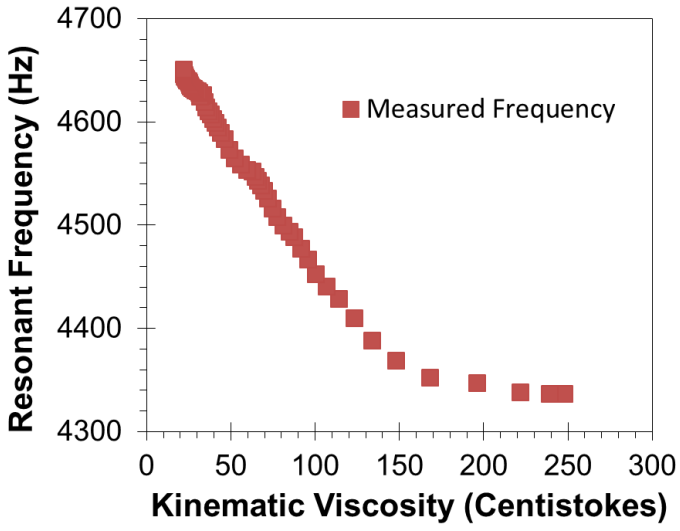
Technology Description

In the fields of rheology and tribology, viscosity is one of the most important factors utilized to characterize fluid properties. The food industry performs viscosity measurements to optimize the production process as it travels through pipes and dispensers. On-line viscosity monitors are needed in the production line to prevent production and quality issues which can lead to downtime and other production expenses.





Viscosity changes in lubricant, such as motor oil, could also result in major breakdowns and repairs. Along with other parameters, such as acidity, water and soot content, viscosity must be monitored as lubricants degrade over their lifetime of storage or use. In-line or field measurements, such as those possible with this sensor, enable continuous and near real time measurements. This can provide benefits over off-line discrete sample measurements made with laboratory instruments and thereby more quickly anticipate and adjust processes and procedures to maintain quality and system performance. Micro-electro-mechanical (MEMs) devices can provide a **small**, **reliable and inexpensive** platform for a viscometer (viscosity sensor) that can integrate other sensors. This MEMs viscometer works via resonant frequency, measuring vibrations, of a simple silicon plate and its damping due to surrounding fluid that is compared to known values. The device's simple electrical actuation and sensing is an



advantage over other MEMs technologies that use piezoelectric and/or electromagnetic materials or optical methods.

Tests on standard calibrating oils, commercial motor oils, and water-glycerol mixtures, have shown a low correlation error (±5%) in the range of viscosities tested up to 600 centistokes (mm^2/s). Measurements at high temperature (>50 ^oC) and long duration (>1x10^6 cycles) have shown high device reliability and low drift (<1%).

Keywords: Viscosity sensor, Micro-Electro-Mechanical Sensor, MEMs, CMOS, Lubrication, Thermal actuation, Viscometer, Engine Maintenance, Diagnostics, Food Quality Measurement, Lubricant Quality Measurement

Technology Readiness

An Alpha Version of the Miniaturized Viscosity Sensor has been developed and tested.

Idea	Concept	**Prototype**	**Alpha Version**	Beta Version	Released

Intellectual Property

Miniaturized Viscosity Sensor is the subject of an issued patent, US 8,751,172

Applications

The RIT MVS device has been developed to be inert and compatible with food processing where a consistent product viscosity is needed. The MVS Miniaturized Viscosity Sensors can be integrated into automotive, industrial and power systems in which real-time monitoring of lubricating and/or insulating fluid conditions is needed. In-situ field installed viscosity monitoring systems would save costs by providing faster reporting of viscosity "out of limit" measurements and thereby prevent expensive product as well as equipment issues.

Target Customers

- Food industry
- Automotive industry
- Industrial machinery
- Power industry
- Petroleum processing and lubricant manufacturers

Opportunity

RIT's Intellectual Property Management Office (IPMO) is interested in working with those parties who are qualified and interested in the commercialization of the Miniaturized Viscosity Sensor.

Contact

Those interested in learning more about this opportunity should contact:

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