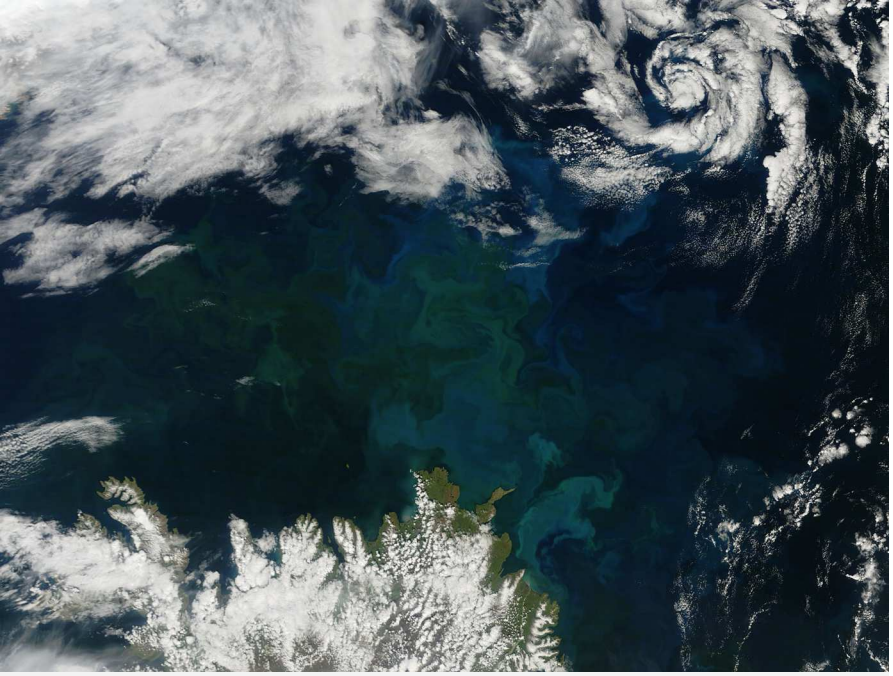

National Aeronautics and
Space Administration

technology solution

Sensors

Lab-On-Chip Flow and Temperature Sensor

Provides accurate and real time measure of flow rates and temperature in next generation microfluidic instruments

NASA Goddard Space Flight Center has developed a sensor for micro analytical systems that measures, in real time, the flow rate and temperature of the liquid being sampled. Current sensors divert the liquid to separate temperature and flow sensors, which can result in fluid leakage and the need for a larger initial sample. This design eliminates that diversion. The system sensors will be able to measure flow rates in the nano-liter per minute range, and temperatures from greater than 150o C down to below -80o C.

BENEFITS

- Measures flow and temperature of fluids being analyzed in micro analytical systems
- Small enough to be used in lab-on-chip applications
- Novel design reduces fluid leakage and the amount of sample required

THE TECHNOLOGY

The sensors in this system will be encased in Silicon Nitride (SiN) to electrically isolate them from the fluid flow and will be suspended in the middle of the channel to maximize their sensitivity and response time. The temperature sensors are utilized as part of the flow sensor design. The temperature sensor in front (before) of the heater will give the initial temperature reading for the fluid. The sensor behind (following) the heater will measure how much heat the heater was able to inject into the fluid. By knowing the thermal conductance and the heat capacity of the fluid, in addition to the power into the resistor and the change in temperature, the flow rate of the fluid can be calculated.

The sensors will be fabricated on a silicon (Si) wafer that has a micro channel etched into it. A sacrificial layer will be deposited on to the Si wafer to back fill the channels; this will provide a planar surface to fabricate the sensors.

APPLICATIONS

The technology has several potential applications:

- Microfluidics
- Microbiology
- PCR Sampling for Point of Care Applications

PUBLICATIONS

Patent No: 10189700

More Information

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