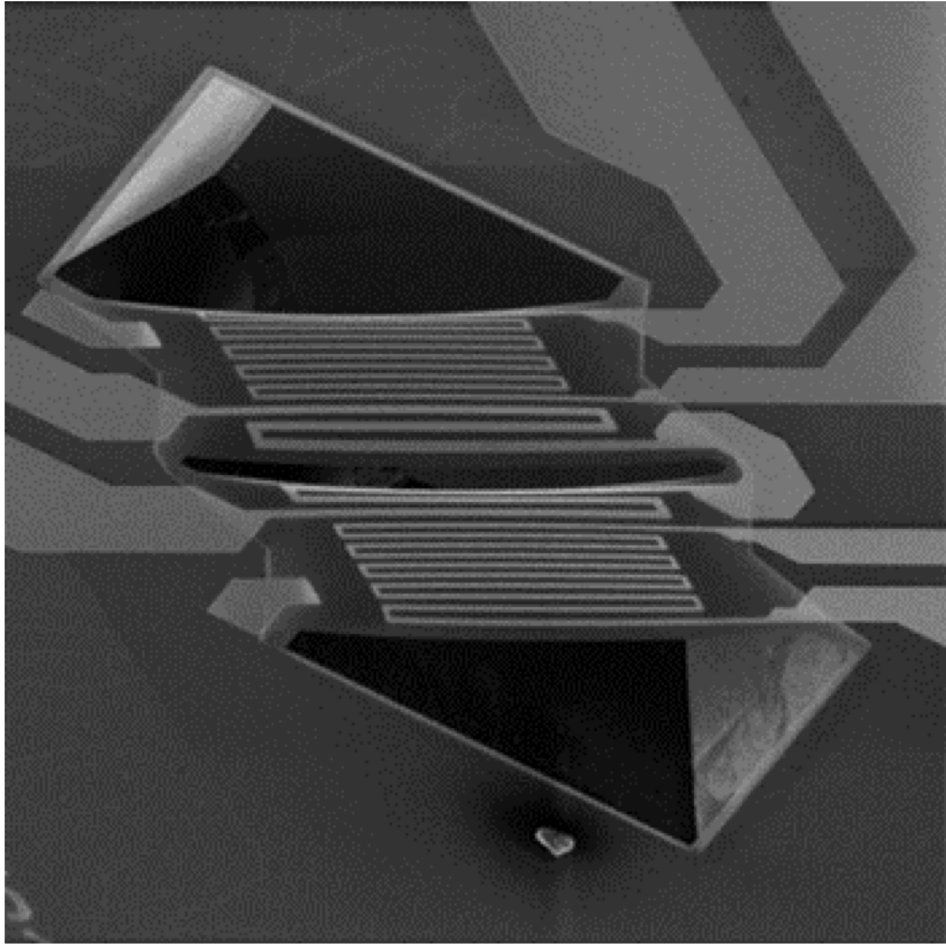


MEMS based gas Mass Flow sensors



Magnification of the MEMS air flow, with the microheater, and temperature sensor. Overall chip size are ~ 1.7 x 3.3 mm.

STATUS

The FBK MEMS mass flow sensors are currently on board on the space satellites for the long-term space missions GAIA, LISA PATHFINDER, MICROSCOPE and EUCLIDE.

The TRL level is 9.

RIFERIMENTI E LINK

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DESCRIPTION

MEMS devices based on Bulk Micromachining technologies for the realization of flow sensors / gases and microthaterial microsattellites.

General Characteristics

- The MEMS mass flow sensor provides the actual mass flow rate at the MT inlet, strictly related to the generated thrust level.
- It detects the "temperature unbalance" in presence of the gas mass flow, between two thermometers, while a constant amount of power is provided in between.
- Si-Chip technology: a heating element is positioned in between the upstream and downstream temperature sensing elements (thermo-resistors)
- Inside the Si chip, two other temperature sensors are realized for thermal stabilization

SPECIFICATIONS

Inlet pressure

- Nominal operating 0-2 bar
- Proof 6 bar
- Burst 12 bar

Flow rate @ nominal inlet pressure

- For CGP applications with N2 from 0.005 to 5 mg/s
- For EP applications with Xe from 0.05 to 25 mg/s

Power consumption: few mW

Time response about 10ns

Sensitivity: 0.1 sccm

Accuracy: up to 1% of the measured flow

ADVANTAGES & APPLICATIONS

Components for Mass Flow Controllers systems for the micropropulsion (cold gas micropropulsion) in microthrusters for space satellites.

Main advantage are related to the low power consumption, high sensitivity and fast response.

The component can be re-configured also for non-space applications.

Current interest is the conversion of technologies for applications in the field of heating systems (boilers), heating distribution (thermal power plants) and automotive sector.

The device. In a next release, was also integrated with gas sensors for on-line combined measure of flow rate and gas concentrations.