UNIVERSITY of DENVER
INTELLECTUAL PROPERTY & TECHNOLOGY TRANSFER

Micromechanical Resonators

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Summary: Thermally actuated resonators for high-quality performance in liquids

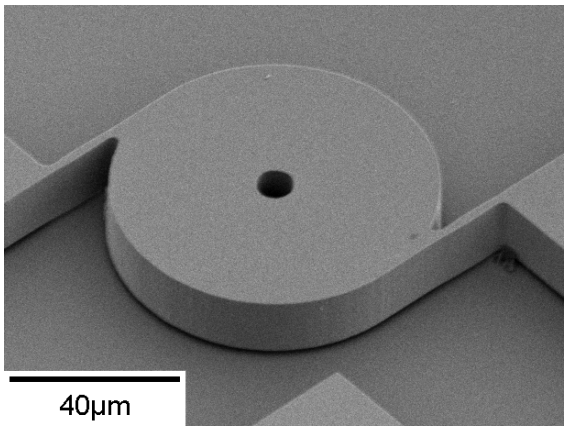
Description: These resonators, which operate through thermal-piezoresistive transduction, are smaller, more integrated and higher resolution replacements for traditional piezoelectric mechanical resonant sensors. This invention involves various resonator designs, including a disk actuated by two tangential support beams. The temperature instability of silicon has been a drawback to its use, but this patent allows for fine tuning of the resonator's stability by changing the operating bias current and doping the actuator beams. The resonator is also capable of absorbing DC current from a source and acting as an AC energy pump to initiate and sustain its own mechanical oscillations through a feedback loop of expansion and contraction.

Advantages of this Invention:

- Quality factors as high as 284 in water (more than 3x the previous highest demonstrated)

- TCF as low as -0.05ppm/°C (compared to -40ppm/°C with standard silicon resonators)

- Self-sustaining oscillation capabilities



Potential Areas of Application:

- Measurement of various chemical and/or biological species in a liquid or gas sample

- Replacement of larger, less effective piezoelectric mechanical resonant sensors

Stage of Development: Testing completed, disclosures made in 2010

DU Log Number: #212-214

Intellectual Property Status: Patent Pending, Application #13/878,980

Opportunity: We are seeking a strategic partner to develop and commercialize this invention.

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