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Thermally-Stable Nonuniform Microcorrugated Capacitive MEMS Tuner

A novel, thermally-stable microcorrugated diaphragm significantly reduces actuation voltage variation and increases continuous tuning range for capacitive MEMS tuners, enabling reliable operation in environments with large temperature variations.

Uniform microcorrugated diaphragms (UMCDs) can be used as MEMS tuners for evanescent mode cavity resonators/filters with high tuning range and low tuning voltage. The microcorrugated structure effectively relaxes stresses; thus, it reduces the sensitivity of the tuner's stiffness to stress and temperature. However, the stress reduction is accompanied by a vertical offset that is prominent under compressive stresses. Therefore, there is an unmet need for more effective and efficient MSMS tuners.

Researchers at Purdue University have developed a novel, thermally-stable, nonuniform microcorrugated diaphragm (NMCD) designed for a capacitive MEMS tuner with a large continuous tuning displacement. Experimental results show that the enhanced thermal stability of the novel NMCD allows for operation in environments with large temperature variations. The measured center offset is reduced by 13.5 times compared to UMCDs.

Advantages:

-Reduced variation of actuation voltage over a wide temperature range

-Allows the diaphragm to be continuously tunable in its full desired range

Potential Applications:

-Capacitive MEMS tuners

-Electrical/electronics industry

TRL: 6

Intellectual Property:

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Category
Semiconductors/Devices & Components
Semiconductors/Thermal Management & Cooling Technologies

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