

Stress tuning of membrane resonators through on-chip heating

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The nonlinearity of micro-electro-mechanical systems (MEMS) has gathered great interest for research as well as many engineering applications, like signal processing [1] and amplification [2], mass sensing [3], displacement measurement [4] and more. The nonlinearity is inherent to the MEMS, but it can be tuned by heating the device [5]. Additionally the shift in the eigenfrequency during a temperature change can be precisely observed in the linear regime, allowing for applications as temperature sensors [6].

Here we demonstrate the shift in eigenfrequency, by increasing the temperature with a resistive on-chip heating structure around a silicon nitride membrane and observe its nonlinear behavior with changing temperature via imaging white light interferometry.

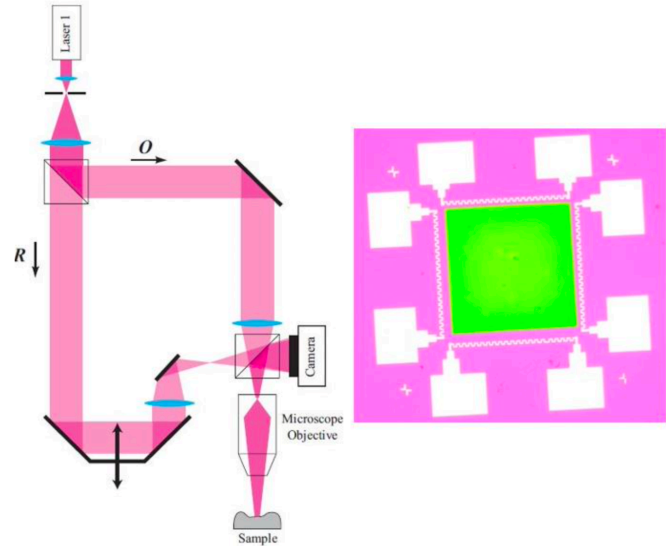


Fig. 1: Simplified optical principle of an IWLI and the Au/Ti heater set-up around the membrane.

References:

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