All-Optical Frequency Modulated High Pressure MEMS Sensor for Remote and Distributed Sensing - DTU Orbit (07/10/2019)

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We present the design, fabrication and characterization of a new all-optical frequency modulated pressure sensor. Using the tangential strain in a circular membrane, a waveguide with an integrated nanoscale Bragg grating is strained longitudinally proportional to the applied pressure causing a shift in the Bragg wavelength. The simple and robust design combined with the small chip area of $1 \times 1.8$ mm$^2$ makes the sensor ideally suited for remote and distributed sensing in harsh environments and where miniaturized sensors are required. The sensor is designed for high pressure applications up to 350 bar and with a sensitivity of 4.8 pm/bar (i.e., $350 \times 10^5$ Pa and $4.8 \times 10^{-5}$ pm/Pa, respectively).

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