Supplemental Document

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Compact highly sensitive Fabry–Perot temperature and gas pressure sensing probe fabricated by a femtosecond laser and PDMS: supplement

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Supplementary materials for "Compact highly-sensitive Fabry-Perot temperature and gas pressure sensing probe fabricated by femtosecond laser and PDMS"

1. Comparison of temperature and gas pressure sensors based on PDMS

Compared with the sensors for simultaneous measurement of temperature and gas pressure in literature [13-18], all structures adopt sensitive materials to improve the sensitivity of the sensor, but our sensor has the highest sensitivity of temperature and gas pressure, our structure is the simplest and compact. We have made a comparison in the list of supplementary materials.

TABLE I

Comparison of temperature and gas pressure sensors based on PDMS

Sensor structure	Temperature Sensitivity (nm/°C)	Gas pressure Sensitivity (nm/MPa)	Simultaneous measurement	Ref. [year]
UV glue based-FPI and FBG cascade	0.748	8.45	Yes	[13] [2019]
Two PDMS based-FPI cascade	2.62	20.63	Yes	[14] [2020]
microfiber MZI sealed with PDMS	-7.41	13.31	Yes	[15] [2020]
Two F-P polymer cavities in parallel	10.29	-36.93	Yes	[16] [2021]
PDMS based-MZI and a MZI cascade	8.455	78.553	Yes	[17] [2021]
PDMS packaged optical microfiber coupler combined Sagnac loop	-2.133	3.416	Yes	[18] [2022]
a fiber core reflecting surface and PDMS based-FPI	14.41	113.82	Yes	This work

2. Temperature and pressure sensitivity measured at a dip wavelength near 1550 nm of the interference fringe of the sensor spectrum.

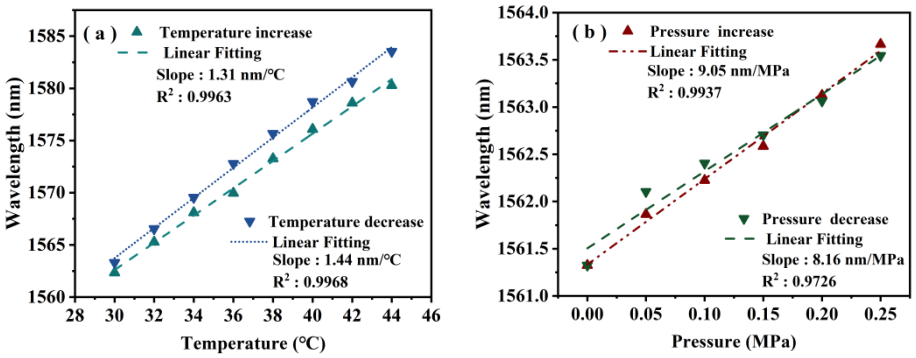

Fig. 1. Fitting of the dip wavelength (near 1550 nm) of the interference fringe of the sensor spectrum with (a) temperature change and (b) gas pressure change.

Here, we studied the temperature and gas pressure response characteristics of the sensor by choosing a dip wavelength near 1550 nm of the interference fringe in the sensor interference spectrum. The experimental results are recorded in Fig. 1. It can be found from Fig. 1 that the sensitivities of temperature and gas pressure of sensor are 1.31 nm/°C and 9.05 nm/MPa respectively. Compared with the temperature and gas pressure sensitivities of the spectrum envelope, it was found that the temperature sensitivity was amplified 11 (14.41/1.31=11) times and the gas pressure sensitivity was amplified 12.6 (113.82/9.05=12.6) time. The results show that tracking spectral envelope can obtain higher sensitivity than tracking interference fringe.