

Response to Reviewer 4 Comments

We would like to thank you for your efforts in reviewing our manuscript and providing many helpful comments and suggestions. Those comments are all valuable and very helpful for revising and improving our paper, as well as the important guiding significance to our researches. We have studied comments very carefully. Based on your criticisms, comments and suggestions, we have revised the manuscript accordingly. Revised portion are marked in red in the paper. The details are explained below, where the number of the response is in correspondence with the number of the reviewers' comments and suggestions.

Point 1: The paper could discuss potential applications of the proposed sensor, such as in high-precision magnetic field measurements in various fields, to demonstrate its practical significance.

Response: The proposed sensor has potential application in high-accuracy magnetic field measurement.

The above information is added in line 191-192.

Point 2: Also the paper could delve deeper into the mechanism behind the low temperature sensitivity and high accuracy of the sensor, to provide a deeper understanding of its underlying science.

Response: The mechanism behind the low temperature sensitivity and high accuracy of the sensor is provided in line 129-136 in the revised manuscript as follows:

Further, the reflected spectrum shift of the sensor from 0°C to 80 °C with different diameters is also calculated in Fig. 4. Consistent with the above theoretical analysis, the temperature sensitivity of 10 μm MF-BG is 17.7 $\text{pm}/^\circ\text{C}$, showing that the temperature sensitivity has been overbalanced. In contrast, the temperature sensitivity of 2 μm MF-BG is $-33.98 \text{ pm}/^\circ\text{C}$, which is the underbalanced grating. When MF-BG diameter is 2.94 μm , the central wavelength of the reflection spectrum changes little.

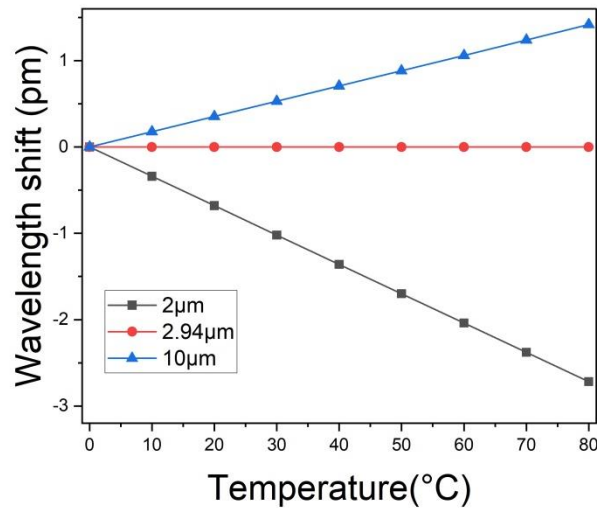


Figure 4. Spectrum shift of the sensor from 0°C to 80 °C with different MF-BG diameters.

Point 3: The authors should provide clarification on the technical terms such as MF-BG and FF, which may not be known to all readers.

Response: Thank you for your suggestion. The clarification on the technical terms of FF in line 26-28 and we have provided clarification on the technical terms of MF-BG in line 43-46.

Point 4: Providing more context on the significance of the results, for example, why the temperature sensitivity of 0.13 pm/°C is considered ultralow and why the Bragg wavelength shift of 146 pm is considered significant.

Response: More context on the significance of the results is added in line 188-193.

The performance comparison between the MF-BG magnetic field sensors in our work with other reported fiber structures is shown in Table 1. The proposed sensor has potential application in high-accuracy magnetic field measurement.

Table1. Performance of FF based fiber sensors compared with other work.

Ref.	Sensor structure	Measurement range	Sensitivity	Temperature range	Temperature sensitivity
[11]	PCF	300-500 Gs	2.367 pm/Gs	30-100 °C	3.2 pm/ °C
[12]	MKR	0-220 Gs	0.56 pm/Gs	20-80 °C	0.17 pm/ °C
[25, 26]	Tilted FBG	0-190 Gs	0.451 pm/Gs	20-60 °C	8.4 pm/ °C
Our work	MF-BG	0-221 Gs	0.667 pm/Gs	20-80 °C	0.13 pm/ °C

Point 5: The text could benefit from a clearer and more concise writing style to improve readability and clarity.

Response: The manuscript has been carefully revised considering about the language and grammar problems as follows:

Line 18: “responsibility” is modified as “sensitivity”

Line 37-38: “tiled FBG” is modified as “tilted FBG”

Point 6: Several typographical mistakes are present, for eg. In equation 1 the grating period is showing with different symbol. Eg. 3 must be properly oriented.

Response: It is modified as your suggestion in line 75.

Point 7: Authors need to add some of the important journals related to Bragg grating applications for refractive index sensing,

- Optics Communications (2017) 402:408–412. doi:10.1016/j.optcom.2017.06.051
- Compact SOI nanowire refractive index sensor using phase shifted Bragg grating," Opt. Express 17, 15330-15341 (2009).
- <https://doi.org/10.1117/12.869644>
- doi:10.1016/j.ijleo.2018.04.034
- Modelling of photonic wire Bragg gratings, Optical and Quantum Electronics, vol. 38, pp. 133-148, 2006

- High-Q and temperature stable photonic biosensor based on grating waveguides. Optical and Quantum Electronics (2018) 50:307. doi:10.1007/s11082-018-1578-x

Response: Thank you for your suggestion. The related journals are added in the reference.

Thank you again for your comments!