Dual functional asymmetric plasmonic silver nanostructure for temperature and magnetic field sensing

Simitha S, [a] Shinto M Francis, [b] Jesly Jacob*[b] and Vibin Ipe Thomas*[a]

[a] *Department of Chemistry, CMS College, Kottayam-686001, Kerala, India*

[b] *Department of Physics, Assumption College, Changanacherry, Kottayam-686101, Kerala, India*

Corresponding Author

Dr. Vibin Ipe Thomas. Dr. Jesly Jacob

vibin@cmscollege.ac.in jeslyjacob@assumptioncollege.edu.in

Supplementary information

Table S1: Comparison of dual parameter sensitivity of published works

Reference	Sensor	Magnetic field sensitivity (pm/Oe)	Temperature sensitivity (pm/ºC)
1	Photonic crystal fiber plasmonic sensor with dual-polarized modes	265	1410.7
2	Two channel photonic crystal fiber	65	2360
3	Dual-core D-shaped photonic crystal fiber	77.9	1151
4	Two open ring channels SPR-PCF	308.3	6520
5	Dual-channel photonic crystal fiber	1970	5500
6	Trigonal cluster-based ultra-sensitive SPR-PCF	160	1250
7	Fractal cladding PCF-based plasmonic sensor	670	1200
8	This work	12663.2	5218

Fig.S1 Experimental setup diagram of the proposed sensor

In the experimental setup, a broadband optical source is connected to a polarization controller for adjusting the polarization of the light source supplied to the SPR sensor. The sensor is surrounded by two magnets connected to a DC supply and a heat blower to control the magnetic field and temperature around it, respectively. Upon plasmonic excitation, the proposed asymmetric sensor detects the surrounding magnetic field and temperature variations, and the output spectra are analyzed using an optical spectrum analyzer connected to the sensor.

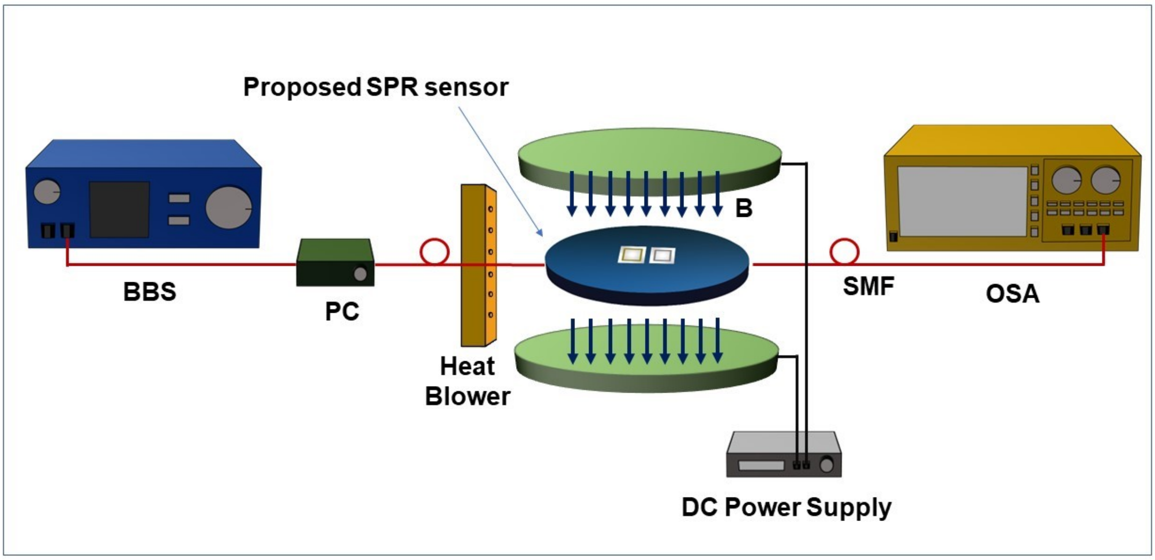

Fig.S1 Experimental setup diagram of the proposed SPR sensor comprising a broadband source (BBS), polarization controller (PC), heat blower, DC power supply, and an optical spectrum analyzer (OSA).

Reference

1 S. Gu, W. Sun, M. Li, Z. Li, X. Nan, Z. Feng and M. Deng, *Optik (Stuttg).*, 2022, **259**, 169030.

2 D. Wang, Z. Yi, G. Ma, B. Dai, J. Yang, J. Zhang, Y. Yu, C. Liu, X. Wu and Q. Bian, *Phys. Chem. Chem. Phys.*, 2022, **24**, 21233–21241.

3 J.-K. Wang, Y. Ying, Z.-J. Gao, S.-Y. Cheng and G.-Y. Si, *Instrum. Sci. \& Technol.*, 2022, **50**, 271–287.

4 D. Wang, W. Zhu, Z. Yi, G. Ma, X. Gao, B. Dai, Y. Yu, G. Zhou, P. Wu and C. Liu, *Opt. Express*, 2022, **30**, 39055–39067.

5 J. ; Lv, F. ; Wang, C. ; Hu, L. ; Yang, H. ; Fu, Y. ; Zeng and P. K. ; Chu, , DOI:10.3390/coatings12060742.

6 M. R. Islam, M. M. I. Khan, R. Al Rafid, F. Mehjabin, M. S. Rashid, J. A. Chowdhury, N. Zerin

and M. Islam, *Sens. Bio-Sensing Res.*, 2022, **35**, 100477.

7 I. Danlard, I. O. Mensah and E. K. Akowuah, *Optik (Stuttg).*, 2022, **258**, 168893.