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Tapered No-Core Fibre incorporated with Molybdenum Disulfide-based Refractive Index Sensor
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Abstract
This paper presents the design, fabrication, and sensitivity evaluation of refractive index measurement based on no-core fibre (NCF) based sensor. The NCF sensor undergoes several fabrication processes to enhance sensitivity, including carbon dioxide (CO2) tapering and molybdenum disulfide (MoS2) coating. This integration will enable the sensor to exhibit superior sensing responses. Experimental results demonstrated that the coated MoS2 tapered no-core fibre (TNCF) based refractive index sensor exhibited a significantly higher sensitivity of 113.52992 ± 7.13889 nm/RIU, compared to the sensitivity of coated NCF and bare NCF, which are at 79.73184 ± 5.85083 nm/RIU and 64.9418 ± 4.56332 nm/RIU, respectively. This shows that the TNCF coated with MoS2 exhibited a higher sensitivity make it a potential candidate for various real-time applications. Professionals in industries related to chemical sensing, environmental monitoring, and industrial process control may benefit from the development of reliable and reusable sensor probes.

Author Keywords
molybdenum disulphide; NCF; refractive index; TNCF

Index Keywords
Bioremediation, Chemical industry, Environmental monitoring, Process control, Refractometers, Reusability; Core fibre, Design evaluation, High sensitivity, Molybdenum disulfide, No-core fiber, Refractive index measurement, Refractive index sensor, Sensitivity evaluation, Tapered no-core fiber; Molybdenum disulfide

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