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# Stretchable Distributed Fiber Bragg Grating for Sensor Applications

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# Abstract

Fiber Bragg Grating (FBG) sensors have been widely used due to their simplicity and high sensitivity. One of their distinct features includes their ability to allow distributed measurements for several arrays of FBG sensors. However, conventional FBGs have a limited strain range and poor performance due to their stiff nature, which makes them easy to break when overstrained and hence affects their practical applications. Besides, a single FBG sensor measurement at a time is inefficient and time-consuming, especially when measuring multiple parameters such as strain and temperature. In this work, distributed FBG sensor was successfully demonstrated along with embedded FBG coated with polydimethylsiloxane (PDMS) to enhance its stretchability. Comparison analysis showed the wavelength shift for FBG coated with PDMS was higher than the bare FBG. This PDMS-coated FBG strain sensor was tested in terms of straight-line and S-shaped, evaluated by angular displacement from 0-90. Result reveals that the straight-lined shape of PDMS-coated FBG gives uniform red shifted wavelength as compared to the S-shaped. This study may contribute to the advancement of fiber sensing technologies and offers practical solutions for monitoring applications. © 2025 IEEE.

## Author keywords

Distributed; Fiber Bragg Grating; Fiber optic sensor; PDMS; Stretchable

## Indexed keywords

### Engineering controlled terms

Electric sensing devices; Engineering research; Fiber optic sensors; Photonics; Red Shift; Solid-state sensors

### Engineering uncontrolled terms

Coated fibers; Distributed; Distributed measurements; Fiber Bragg; Fiber Bragg Grating Sensors; Fibre-optic sensor; High sensitivity; S-shaped; Sensor applications; Stretchable

### Engineering main heading

Fiber Bragg gratings; Microchannels

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