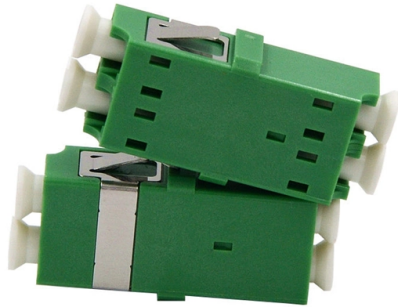


Embedded Fiber Bragg Grating Sensor



Overview

A compact fiber Bragg grating (FBG)-based strain sensor has been developed by embedding an FBG inside a 3D-printed structure, allowing the comparison of FBG responses across different filaments such as polylactic acid (PLA), thermopl. A compact fiber Bragg grating (FBG)-based strain sensor has been developed by embedding an FBG inside a 3D-printed structure, allowing the comparison of FBG responses across different filaments such as polylactic acid (PLA), thermoplastic polyurethane (TPU), polycarbonate (PC), acrylonitrile butadiene styrene (ABS), and nylon. Results have shown th. ••The performance for FBG strain sensors embedded in different 3D printed materials are compared. ••FBG embedded in TPU shows the highest mechanical strain sensitivity of 17.7 pm/cm. ••FBG embedded in TPU also exhibits the highest temperature sensitivity of 15.4 pm/°C. ••Small-scale field tests show that FBG em. Fiber Bragg gratingStrain sensor3D printing technologyThermoplastic polyurethanePolylactic acidPolycarbonateAcrylonitrile butadiene styreneNylonThe advances in laser systems and modern low-loss optical fiber in the 1960s became the primary catalyst for the meteoric progression of optical fiber sensing technology in this contemporary era. The propensity of such advancement in transmitting a vast amount of data compared to other electrical and microwave systems has encouraged researchers to evaluate the possibility of optical fibers for data communication and various applications in the sensing field. During the 1970s, the development of optical fibers has been growing rapidly through some pioneering work on low-loss optical fiber where a silica-core multi-mode optical fiber with losses of about 0.2 dB/km was achieved. This in return significantly broadened the possible applications of optical fiber sensors by combining optoel. 2.1. Strain sensor design and dimensionsThe design and dimensions of the proposed FBG-based strain sensor presented in this work are illustrated in Fig. 1 (a), which shows the 3D view, while the cross-sectional top view of the embedded FBG-based strain sensor i...

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