

Design and fabrication of magnetic field sensor based on thinned optical fiber employing nano ferrofluid

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Abstract

In this research, a cost-effective magnetic field sensor with high sensitivity was designed based on thinned optical fiber covered with magnetic fluid. Nano ferrofluid was characterized through X-ray diffraction analysis and scanning electron microscopy. The magnetic sensor was prepared by placing the ferrofluid around optical fibers with the same length and different diameters. The effect of fiber diameters on the sensor properties was investigated experimentally. Fiber optic with 0.4 mm in diameter exhibited the highest sensitivity 0.0189 mT/dbm and the widest range of field detection from 2.5 mT to 122.5 mT. The Sensor illustrated linear response around 99% in its optimal performance mode.

Keywords: Fiber optic sensor, Nano ferrofluid, Magnetic field sensor, linear response

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