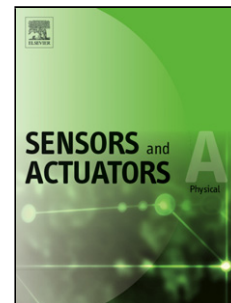


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Refractive Index and Strain Sensing Using Inline Mach-Zehnder Interferometer Comprising Perfluorinated Graded-Index Plastic Optical Fiber

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Abstract

This paper details the fabrication and performance evaluation of an inline Mach-Zehnder interferometer (MZI) consisting of a perfluorinated graded-index plastic optical fiber fabricated via a heat-and-pull tapering technique. This MZI exhibits interference fringes that are sufficiently sharp for usage as refractive-index (RI) and strain sensors. These interference fringes shift linearly with the RI of the surrounding medium, with a proportionality constant of 3.44 nm/RI unit. The measured strain sensitivity of 0.2 pm/ $\mu\epsilon$ suggests that the MZI may be viable for strain-sensing applications.

Keywords: Tapered fibers, plastic optical fibers, heat-and-pull technique, inline Mach-Zehnder interferometry, refractive-index sensing, strain sensing.

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