

Increasing the Sensitivity of Polymer Optical Fiber Sensing Element in Detecting Humidity: Combination of Macro and Micro Bendings

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ABSTRACT

Humidity sensing is essential in various fields, including industrial processes, agriculture, engineering, and health. A material suitable as a sensing element for humidity detecting is polymer optical fiber (POF). In this study, a combination of micro and macro bendings was proposed to increase the sensitivity of the sensing element. The sensing element was constructed by peeling the out-most coating of the POF, but keeping intact the cladding and core. The macro bending was done upon the peeled part of the POF by making a circular form with varying diameter of 3.5, 4.0 and 4.5 cm. The micro bending was constructed by making a local bent via subjecting to electrical discharge flame from an inductor generator with varying number of micro bendings, i.e., 1, 2 and 3. The sensing element was then tested for its sensitivity as a humidity sensor. The sensing element was positioned inside a self-custom made humidity measurement box consisting of a hygrometer and a pipe to stream water vapor inside the box. The normalized power was measured by varying the % humidity inside the box. In general, the result showed that increasing the humidity caused the normalized power to decrease, hence increasing the power loss of the sensing element. Moreover, the sensitivity of the sensing element was increased 10 times for the combined micro and macro bendings compared to a sensing element without micro bendings.

Kata Kunci: *optical fiber sensor*