Optical Fiber-Top Microcavity CO_2 Sensor

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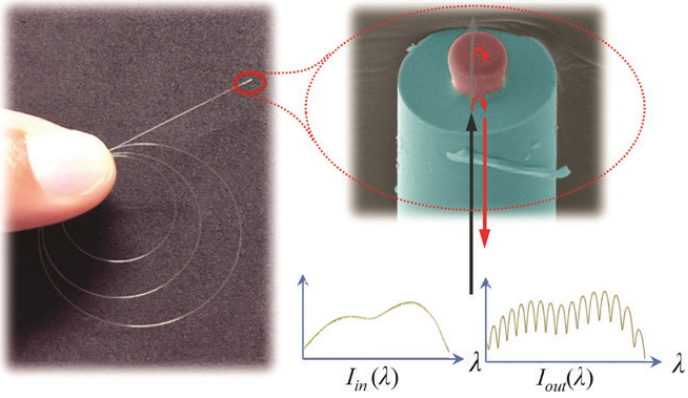
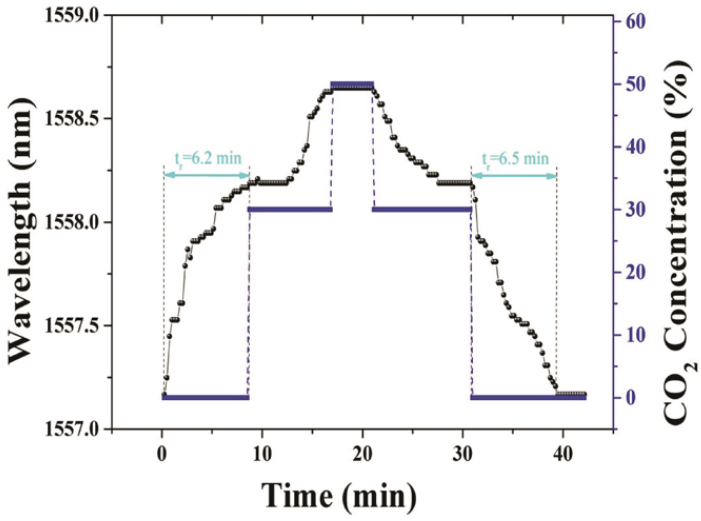
A new type of fiber-optic CO_2 sensor based on a polymer Fabry-Pérot (FP) cavity fabricated on the end face of a standard single-mode optical fiber has been developed. A photo-crosslinkable poly (ionic liquid) (PIL) with strong CO_2 adsorption ability was synthesized and then printed on the top of optical fiber by using an home-built in-situ optical printing technology to form an FP cavity for CO_2 sensing. Experimental results show such a miniature fiber-optic sensor has wide detection range and relatively fast response time for CO_2 detection.





The result of a cycling test for characterization of the dynamic response of the fiber-optic CO_2 microsensor shows that the response time of the CO_2 microsensor is around 6.5 minutes, which is much faster than that previously reported PIL CO_2 sensor (which is about 30 minutes). The fast response time of the CO_2 microsensor is attributed to its small size achieved by optical microfabrication process.

Representative Publication

Optical Fiber-Top Microcavity Sensor for CO_2 Detection

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