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Hollow-core photonic Bragg fiber for bulk and surface sensing applications

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We demonstrate a hollow-core photonic Bragg fiber for bulk and surface sensing applications. The sensor operates on a resonant sensing modality. Variation in the fiber core effective refractive index modifies the bandgap guidance of the fiber, leading to a spectral shift in the fiber transmission spectrum. As a demonstration for the bulk sensing application, we apply the fiber sensor to detect refractive index of analyte filling in the fiber core, a sensitivity of 1500nm/RIU is achieved. As a demonstration for the surface sensing application, we use it to monitor the dissolution dynamic of a thin film coated on the fiber core inner surface, the obtained surface sensitivity is found to be 0.05nm/nm. The proposed sensor presents a 'one fiber' solution for both bulk and surface sensing applications, which is promising for the development of a new generation of the fiber-based biosensors.

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