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# Smart Hydrogel-based Optical Fiber SPR Sensor for pH

## Measurements

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## Highlights

- A hydrogel-coated optical fiber SPR sensor based on MMF-SMF-MMF structure has been fabricated for pH measurements.
- The experimental sensor is able to indicate pH variations in a wide range of 1 to 12.
- The maximum pH sensitivity of the proposed sensor has reached 13 nm/pH at higher pH region (8~10 pH).

**Abstract:** A hydrogel-coated optical fiber surface plasmon resonance (SPR) sensor based on MMF-SMF-MMF structure has been fabricated for pH measurements. When the solutions with difference pH values contacting the sensing probe, the amount of the dissociated carboxylic ions in the hydrogel will change according to the pH value of the solution. This process will modify the volume and refractive index of the hydrogel, which results in a shift of the SPR wavelength. The experimental sensor is able to indicate pH variations in a wide pH range from 1 to 12, and the maximum pH sensitivity of the proposed sensor can reach 13 nm/pH at higher pH region (8~10 pH). The influence of temperature (in the range of 20°C~40°C) on SPR wavelength is found to be weak. Further, the sensor possesses remarkable repeatability and excellent stability. Due to the wide measuring range and simple fabrication process, the sensor is promising to be used for the

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