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Topic of Research: Design and Performance Analysis of Optical Sensors

Findings

- Theoretical parameters of the U-shaped POF sensor investigated, considering combined effect of probe geometry, bend-induced material deformation, and the roughness of the surface of a de-cladded probe in EW FOSs (EWFSs) on the sensitivity of the sensor.
- Observations revealed that at sufficiently low bend radii, the numerical aperture (N.A.) of the bent fiber decreases to zero towards the inner curve of the bend.
- Simulations indicated that the local numerical aperture of the plastic optical fiber changes significantly more when geometric, deformation and surface roughness effects are considered, compared to considering only geometric effects.
- It has been found that the rough surfaces of fiber sensing probes are more sensitive than smoother surfaces.
- Study conducts theoretical and experimental investigations of U-shaped Evanescent Wave Fiber Optic Sensors (EWFOs) for detecting and quantifying iron, phosphate and fluoride concentration in water.
- A U-shaped plastic optical fiber (POF) sensor specifically designed and developed to measure the concentration of iron in supplements.
- The study validated the sensor's performance through comparative analysis, demonstrating accurate detection and quantification of iron concentration in iron supplements based on theoretical predictions.