

Fiber optic sensor for measuring liquid transmittance



Article Overview

Fiber optic sensors can measure liquid transmittance by detecting changes in light propagation through the liquid using interferometry, Bragg gratings, or other optical techniques.

Measurement Principles

Fiber optic sensors (FOS) for liquid transmittance operate by monitoring how light interacts with the liquid. Intrinsic sensors use the optical fiber itself as the sensing element, where the light signal is modulated by the liquid's optical properties, while extrinsic sensors transmit light to an external sensing region and detect changes externally. Common techniques include:

- Fabry-Perot Interferometry (FPI): Measures phase changes in light reflected within a cavity; highly sensitive to refractive index and transmittance variations in the liquid, enabling precise monitoring over long periods without drift or maintenance .
- Fiber Bragg Gratings (FBG): The Bragg wavelength shifts when the fiber is exposed to a liquid, allowing detection of changes in refractive index or absorption, which correlates with transmittance .
- Long-Period Gratings (LPG) and Multimode Interference: These methods exploit wavelength-dependent light coupling to detect liquid properties, suitable for multi-point or distributed sensing .

Advanced Techniques...

Article Content

Jun 15, 2026

(PDF) All-fiber-optic sensor for liquid level measurement

An experimental realization of a simple all-fiber-optic sensor for liquid level measurement is demonstrated. It is an

May 09, 2026

A facile optical sensor: Plastic optical fiber voids as a liquid level ...

Fiber optic sensors use light to measure various parameters and provide real-time information about a system or

Nov 27, 2025

Liquid level sensor based on dynamic Fabry-Perot ...

In this work, a novel optical fiber sensor capable of measuring both the liquid level and its refractive index is designed,

May 27, 2026

Michelson interferometer-based fiber-optic sensing of liquid refractive ...

A fiber-optic sensor for liquid refractive index measurement based on a Michelson interferometer is described. The

Jul 01, 2026

Optical Fibre-Based Sensors—An Assessment of Current Innovations

Since the 1980s, the use of fibre-optic sensors has steadily expanded across a range of applications. The underlying sectors have

Mar 15, 2026

Exploring Fiber Optic Liquid Level Sensors: High-Speed and

Conclusion: Fiber optic liquid level sensors have paved the way for superior liquid level measurements in various

Oct 16, 2025

Using fiber-optic sensors to give insight into liquid-solid phase ...

Abstract Fiber optic sensors offer a new and unique way to detect and analyze phase transitions, due to their small

Mar 26, 2026

Microhole fiber-optic sensors for nanoliter liquid measurement

Here, we outline the cumulative introduction and the previous experimental research work on microhole fiber-optic

Sep 17, 2025

Fiber Optic Sensor for Liquid Volume Measurement

In this letter, we report a novel fiber optic sensor, which will be suitable for precise determination of volume for any

Oct 28, 2025

Fiber-Optic Level Measurement

Hydrostatic pressure measurement with optical sensors enables precise long-term monitoring of liquid

May 23, 2026

Portable optical fiber sensor for continuous liquid level sensing using ...

This paper presents a portable optical fiber sensor (OFS) design for continuous liquid level measurement, fabricated

Mar 23, 2026

Liquid Flow Meter by Fiber-Optic Sensing of Heat Propagation

Optical fiber-based flow sensors to date operate using optical fiber interferometry [7, 8] or optical hot-wire anemometry

Jul 15, 2026

Fiber-optic liquid level sensing system based on a titanium diaphragm ...

To achieve precise liquid level measurements, diverse fiber-optic sensing mechanisms have been extensively explored.

Nov 22, 2025

Microhole fiber-optic sensors for nanoliter liquid measurement

Microhole optical fiber sensors have the characteristics of simple structure, enclosed environment, strong light and

Aug 01, 2025

Fiber-optic liquid-level sensor

An intensity-based fiber-optic liquid-level sensor for point measurement is described. The sensing principle is based

Jul 29, 2025

Fiber-optic liquid-level continuous gauge

Abstract An intensity-based fiber-optic liquid-level gauge for continuous measurement is described. The sensing

Feb 24, 2026

(PDF) Plastic Optical Fiber as Water-Level Sensor

This research presents a low-cost sensor for measuring liquid levels using plastic optical fibers (POF). The sensor

Jul 26, 2026

Anti-Crosstalk Fiber-Optic Liquid Level Sensor Based on Hollow-Core ...

In this letter, we develop a novel fiber-optic sensor based on a hollow-core Bragg fiber (HCBF) for high-precision detection of liquid

Jan 09, 2026

Optical Fiber Sensors for Chemical and Biological Measurements

Moreover, it is feasible to place several sensors (similar or different) in diverse places along the same optical fiber,

Oct 14, 2025

Liquid Flow Meter by Fiber-Optic Sensing of Heat Propagation

Hot-wire anemometers estimate flow rates by measuring the heat losses from a heating element with a fiber

Nov 13, 2025

Quasi-Distributed Optical Fiber Sensor for Liquid-Level Measurement

A novel fiber-optic liquid level sensor based on a cross-correlation optical time-domain Fresnel reflection technology is proposed and

Jan 27, 2026

Wide-range reflective optical fiber liquid-level sensor

To achieve accurate, continuous, and online monitoring of liquid levels over a wide range, we investigate a liquid level

Sep 09, 2025

Plastic fiber optic sensor for continuous liquid level monitoring

In addition, the fiber optic level sensor shows a stable and reproducible response over several cycles of 30 min

Jun 03, 2026

Distributed Fiber Optic Sensor for Accurate Liquid Level Monitoring ...

In this study, we propose a distributed fiber optic liquid level sensing system that overcomes these limitations by

May 16, 2026

Fiber optic sensors for liquid level measurement

The large number types of sensors with the various principles have been used for the liquid level measurement.

Nov 21, 2025

Liquid concentration measurement based on SMS fiber sensor with ...

Abstract A highly sensitive liquid concentration sensor based on a single-mode-multimode-single-mode (SMS) fiber

Feb 27, 2026

Polymer Optical Fiber Liquid Level Sensor: A Review

Polymer optical fiber (POF) level sensors have a lot of potential in liquid level sensing because of their inherent safety,

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