## Fiber-Optic Sensors for Hydrogen Peroxide Vapor Measurement

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**Abstract :** This paper reports on the response of a fiber-optic sensing probe to small concentrations of hydrogen peroxide (H2O2) vapor at room temperature. H2O2 has extensive applications in industrial and medical environments. Conversely, H2O2 can be a health hazard by itself. For example, H2O2 induces cellular damage in human cells and its presence can be used to diagnose illnesses such as asthma and human breast cancer. Hence, development of reliable H2O2 sensor is of vital importance to detect and measure this species. Ferric ferrocyanide, referred to as Prussian blue (PB), was deposited on the tip of a multimode optical fiber through the single source precursor technique and served as an indicator of H2O2 in a spectroscopic manner. Sensing tests were performed in H2O2-H2O vapor mixtures with different concentrations of H2O2. The results of sensing tests show the sensor is able to detect H2O2 concentrations in the range of 50.6 ppm to 229.5 ppm. Furthermore, the sensor response to H2O2 concentrations is linear in a log-log scale with the adjacent R-square of 0.93. This sensing behavior allows us to detect and quantify the concentration of H2O2 in the vapor phase.

Keywords : chemical deposition, fiber-optic sensor, hydrogen peroxide vapor, prussian blue

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