

Fiber optic sensors for hydrocarbon detection

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Abstract

We report the use of optical sensors based on long period gratings written in standard telecommunication fibers. Applying electrical arc discharges from a fusion splicer produces the optical devices. Results from the hydrocarbon detection in fuel, water and atmospheric environment are shown. Wavelength shifts in the long period gratings attenuation peak as longer as 10.3, 2.6, 50.6, and 6.1 nm are obtained when different concentrations of turpentine, naphtha, paint thinner, and anhydrous alcohol, respectively, are added to the commercial Brazilian gasoline blend. The exposition of long period gratings to a mixture of butane and propane in air results in a wavelength shift of 0.6 nm in the attenuation peak. In the experiments carried out in water environment, a 6 nm wavelength shift is measured in the hydrocarbon presence. These results point to the prospect of using the long period gratings sensor for fuel quality control and for the detection of hydrocarbon vapors in the air or petroleum pollutants in water environments.

Keywords: Optical sensor; Hydrocarbon detection; Long period grating; Refractive index sensor; Water pollutants

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