Thermal characterization of etched FBG for applications in oil and gas sector

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***Abstract* — In this work, we experimentally study the thermal sensitivity of etched fibre Bragg grating immersed in four different commercial petroleum hydrocarbon samples with different refractive index and negative thermo-optic coefficient. The results show that when the surrounding refractive index increases a nonlinear behaviour in the grating wavelength shift becomes noticeable. This nonlinear behaviour is owing to a non constant thermal sensitivity of the device. For the sample with higher refractive index the increase in the temperature causes an increase in the sensitivity from 0.1 pm/ºC to 6.2 pm/ºC.**

***Index Terms* — etched FBG, refractive index, temperature, fibre sensor, petroleum hydrocarbon.**