Application of a long-period fibre grating-based transducer in the fuel industry

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Abstract. This work shows prospects of long-period fibre grating applications as transducers for fuel conformity analysis. The proposed long-period grating transducer was employed to assess the gasoline conformity in commercial gas stations. Grating responses were used to train and validate a radial base function topology of an artificial neural network. The obtained results show that fibre optic sensors supervised by artificial neural networks can integrate systems for smart sensing with high applicability in the petrochemical field. The radial base function had reached a correct classification probability of approximately 94%. The device applicability in the analysis of hydrated ethanol fuel was also investigated by measuring the concentration of ethanol in ethanol–water mixtures. The results showed that the developed transducer can be used to infer the ethanol–water concentration with a resolution of up to 0.23%.