

Established Novel Approach for Chemical Oxygen Demand Concentrations Measurement Based Mach-Zehner Interferometer Sensor

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Abstract : Chemical Oxygen Demand (COD) plays a vital role determination of an appropriate strategy for wastewater treatment including the control of the quality of an effluent. In this study, a new sensing method was introduced for the first time and developed to investigate chemical oxygen demand (COD) using a Mach-Zehner Interferometer (MZI)-based dye sensor. The sensor is constructed by bridging two single mode fibres (SMF1 and SMF2) with a short section (~20 mm) of multimode fibre (MMF) and was formed by tapering the MMF to generate evanescent field which is sensitive to perturbation of sensing medium. When the COD concentration increase takes effect will induce changes in output intensity and effective refractive index between the microfiber and the sensing medium. The adequacy of decisions based on COD values relies on the quality of the measurements. Therefore, the dual output response can be applied to the analytical procedure enhance measurement quality. This work presents a detailed assessment of the determination of COD values in synthetic wastewaters. Detailed models of the measurement performance, including sensitivity, reversibility, stability, and uncertainty were successfully validated by proficiency tests where supported on sound and objective criteria. Comparison of the standard method with the new proposed method was also conducted. This proposed sensor is compact, reliable and feasible to investigate the COD value.

Keywords : chemical oxygen demand, environmental sensing, Mach-Zehnder interferometer sensor, online monitoring

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