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Traceability and linearisation of *in situ* fluorescence measurements using the new V-Lux sensor

Fluorescence has been used to monitor water quality for many years, initially within the laboratory and more recently in the field. The technique provides benefits in both sensitivity and specificity. Targeted compounds include Algae and Dye Tracing chemicals in the visible region of the spectrum and aromatic/heterocyclic hydrocarbons, tryptophan and optical brighteners at UV wavelengths. However, field fluorometers can be challenged by interfering fluorescence from non-target compounds, which can directly impact the accuracy of the readings obtained, which has limited their use. Further, non-linearity in the response can arise when either concentrations of the targeted compounds reach a level where absorption become significant, or turbidity levels are high, which limits the range of standard *in-situ* fluorometers.

To overcome these issues, CTG has developed the V-Lux multiparameter fluorometer. This *in-situ* sensor provides 3 fluorescence channels combined with optical absorbance and turbidity measurements. The latter two parameters are used to correct the fluorescence readings to provide a linear response over an extended dynamic range. The provision of three fluorescence channels allows non-specific background interferences to be assessed and eliminated.

A new calibration methodology has also been developed that reports fluorescence output intensity relative to a traceable Quinine Sulphate fluorescence standard. This approach ensures that the outputs from all fluorometer channels can be compared directly, without reference to the specific calibration compounds used. The approach also allows different fluorometers to be compared directly, which has not been possible up until now and has inhibited the wider uptake of fluorescence as a monitoring tool.

Biography

John has worked in industry for 30 years developing optically based analytical instrumentation. After gaining his PhD in Optical Sensing at Imperial College in 1986, he joined the Biosensors Group at Unilever's Central Research Laboratories to develop novel optical waveguide biosensing techniques. In 1987 he moved to Serono Diagnostics to commercialize both optical biosensors and fully automated medical diagnostics systems. In 1992 he co-founded a small consultancy company with the aim of exploiting expertise in analytical instrumentation before joining the Chelsea Technologies Group (CTG) in 1997. At CTG he has managed a range of system developments including: low cost photometers for the Point of Care market, sophisticated realtime PCR instrumentation for molecular diagnostics and a portable microarray processor for security applications. As Technical Director he is also responsible the development, manufacture and support of CTG's own range of oceanographic, environmental and maritime sensor systems; leading the development of visible and UV fluorimeters for algal analysis and water quality monitoring.

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