

## MASTER'S THESIS

### Development of mode-filtered light chemosensor and its applications

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**Development of Mode-Filtered Light Chemosensor  
and Its Applications**

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**A thesis submitted in partial fulfillment of the requirements  
for the degree of  
Master of Philosophy**

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## ABSTRACT

The sensitivity of a multi-channel mode-filtered light chemosensor has been improved by employing a dual-light source technique. The sensor was constructed from an annular column consisting of a bare optical fibre inserted into a capillary tubing. Sample was introduced through the gap between the fibre and the capillary tubing. A multi-channel charge-coupled detector was set on the side of the capillary tubing at which four detection windows could be simultaneously monitored. The changes in mode-filtered light intensities on exposure to various concentrations of ethanol samples from each window were detected and related to ethanol concentration. The sensitivity of detection was enhanced when a dual-light source instead of a single light source was used. The proposed method has been successfully applied to the determination of ethanol contents of spirit samples. The results were satisfactory compared with the declared values.

This novel technique was also applied to the simultaneous separation of mixtures of organic compounds by combining the techniques of chromatography and mode-filtered light detection. Satisfactory results were obtained for the separation of a sample mixture of acetophenone and toluene by using a liquid-phase mode-filtered light chemosensor with the surface of the optical fibre and interior wall of the capillary immobilised with octadecyl and ethyl moieties. In addition, a gas sample mixture of ethanol and toluene was separated by a gas-phase mode-filtered light chemosensor with the surface of the optical fibre and interior wall of the capillary immobilised with OV25.

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