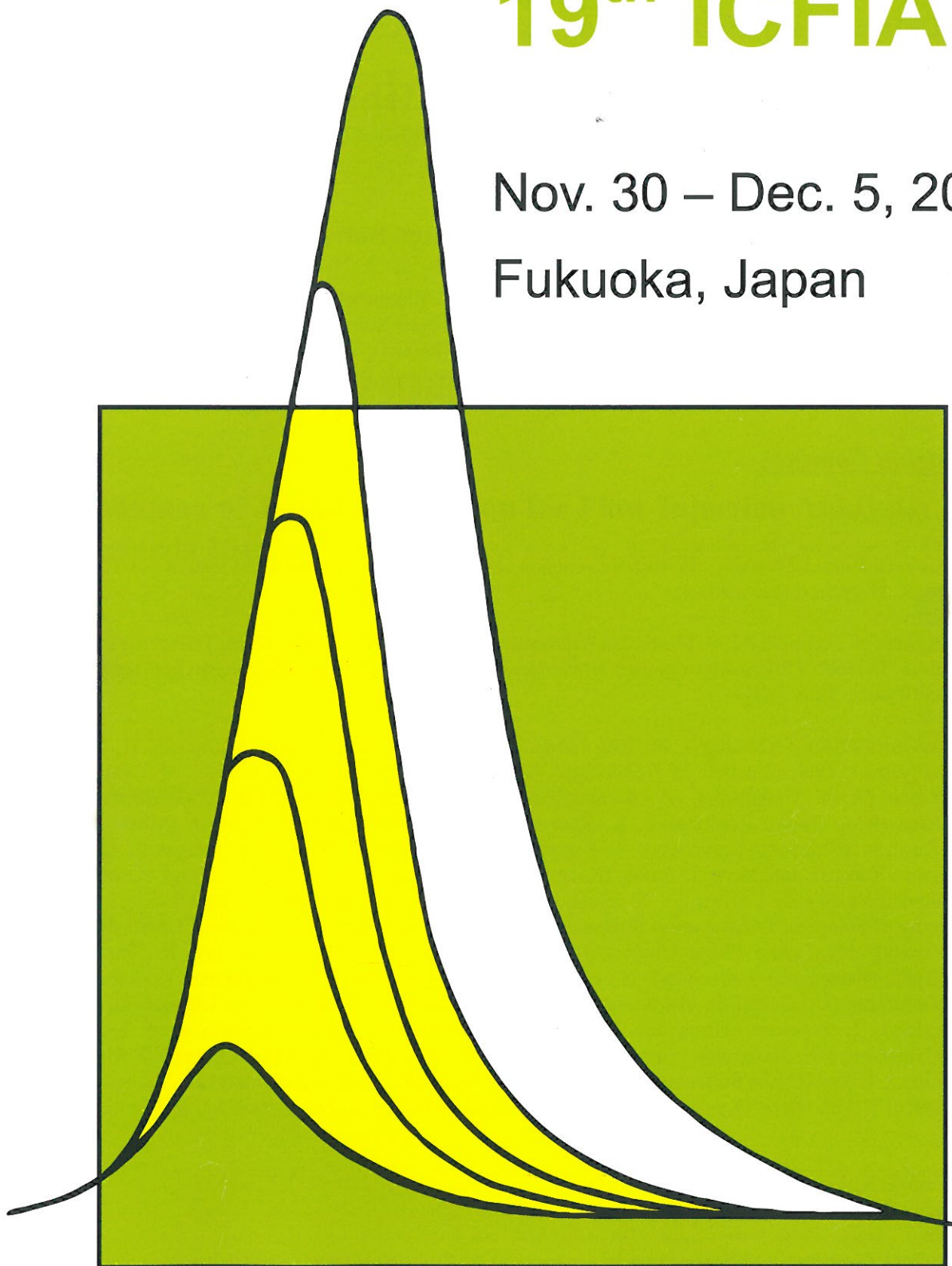


Program &
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19th ICFIA

Nov. 30 – Dec. 5, 2014

Fukuoka, Japan



The 19th International Conference on Flow Injection Analysis (19th ICFIA)

**A flow injection system for the quantification of ethanol in beverages
based on schlieren effect measurement**

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Ethanol is a fundamental parameter to define the quality and the stability of wine samples [1]. There are a number of techniques available to determine the ethanol concentration, usually laborious and complex, requiring in most cases a distillation step as sample pre-treatment. Due to the complexity of the sample matrices, the separation of ethanol can be achieved by means of a membrane separation process; or as also reported making use of a chromatography technique.

Refractive index has been reported as detector procedure in chromatography systems. This effect is usually utilized to characterise chemical species or to determine the composition of binary mixtures of miscible solutions. It is often associated with gradual variations of concentration and can be reproduced relatively easily [2]; therefore can be exploited as a detection method. In this scenario, a flow injection system coupled to a gas-diffusion unit and a CCD detector was arranged in order to develop a methodology for the determination of ethanol in different alcoholic beverages exploiting the schlieren effect measurement.

It was possible to establish a linear range up to 25% (v/v), with a LOD and a LOQ of 0.6% and 2.0% (v/v), respectively; with good repeatability, RSD < 4.6%. Only 80 μ L of sample is needed for quantification with a determination of 60 determinations per hour. To evaluate the accuracy of the proposed method, a total of 43 alcoholic beverages, red and white table wines, port wines, beers, liquors, spirits and brandies were analysed. The results obtained by the developed method are in good agreement with the ones obtained by the reference method.

References:

- [1] M.A. Amerine, C.S. Ough, *Methods for Analysis of Musts and Wines*, Wiley, New York, 1980.
- [2] W. Frenzel, I. McKelvie, *Photometry in: S.D. Kolev, I.D. McKelvie (ed.), (eds.), Advances in Flow Injection Analysis and Related Techniques*, Elsevier, Amsterdam, 2008.

Acknowledgements:

Susana Vidigal acknowledges FCT - Fundação para a Ciência e a Tecnologia, Portugal and FSE for the financial support through the POPH-QREN program via the grant with Ref. SFRH/BPD/78705/2011. This work was supported by National Funds from FCT through project PEst-OE/EQB/LA0016/2013.