

# UV written waveguide devices – Bragg gratings and Applications in Sensors

P.G.R. Smith<sup>1,\*</sup>, C.B.E. Gawith, J.C.G. Gates, D.M. Kundys, F.R. Mahamd Adikan, C.E. Holmes, H.E. Major, M. Garcia-Ramirez, B.D. Snow

<sup>1</sup>Optoelectronics Research Centre, University of Southampton, Highfield, Southampton, SO51 7WB, United Kingdom

\*corresponding author pgrs@orc.soton.ac.uk

## Abstract

UV direct writing (figure 1) provides a powerful route for the fabrication of integrated optical devices. It has significant benefits in terms of simplicity, flexibility and cost which make it attractive for applying integrated optical concepts to other areas of science and technology. Within our group, we have developed a novel approach for creating Bragg gratings in a planar format (figure 2), with great flexibility in terms of centre wavelength, bandwidth and position within chip[1].

These planar Bragg grating devices are ideally suited for use in sensors[2]n etched window is created that allows access of the evanescent field of the optical mode to a liquid measurand. The effective index of the mode is altered by the presence of the liquid, and this, in turn, alters the Bragg wavelength of the grating. By measuring the Bragg grating wavelength shift we can resolve refractive index changes of as small 1 part in  $10^6$ .

In this talk, we will present results on sensors for applications in chemical, phase change and biological sensing. Further recent results will show how this sensor configuration may be used with nematic liquid crystals to achieve tunable grating operation with tuning exceeding 100GHz.

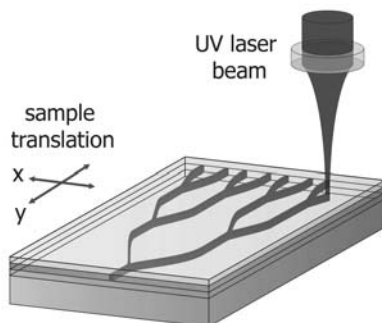


Figure 1: Showing the concept of Direct UV writing

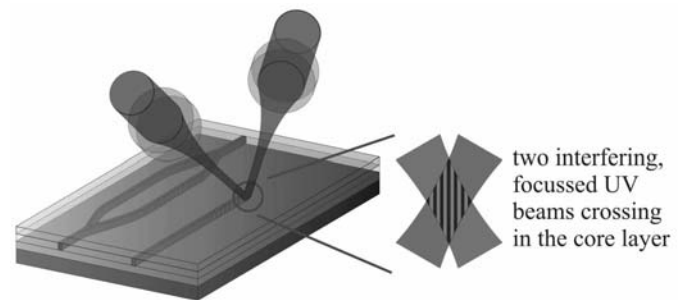


Figure 2: Concept of Direct Grating Writing

Planar waveguide hygrometer and state sensor demonstrating supercooled water recognition

Author(s): Sparrow IJG, Emmerson GD, Gawith CBE, Smith PGR

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## References

[1] C.B.E. Gawith et al, *Electronics Letters*, vol. 39(14), pp.1050-1051, July 2003.

[2] I.J.G. Sparrow et al., *Sensors and Actuators B-Chemical*, vol. 107(2), pp. 856-860, June 2005.