
Influence of the surrounding refractive index on the thermal and strain sensitivities of a cascaded long period grating

R C Kamikawachi *et al* 2007 *Meas. Sci. Technol.* **18** 3111-3116 doi:10.1088/0957-0233/18/10/S10

[R C Kamikawachi](#), [G R C Possetti](#), [M Muller](#) and [J L Fabris](#)

Federal University of Technology—Paraná, Av. Sete de Setembro, 3165, 80230-901, Curitiba-PR, Brazil

E-mail: fabris@utfpr.edu.br

Abstract. This work shows the refractive index sensitivity of a cascaded long period grating and the influence of surrounding media with a different refractive index on the device's thermal and strain sensitivities. The refractive index sensitivity of the double-grating device experiences a maximum increase of about 2.6 times when compared with the sensitivity of a single-grating device, mainly attributed to the cavity between the gratings. The maximum obtained sensitivity of -1554.1 nm per refractive index unit for the cascaded long period grating relates to a sensor resolution of about 6×10^{-6} for refractive index measurements, if an optical spectrum analyser of ± 5 pm of wavelength stability is used in the experiments, whereas this resolution for the long period grating alone is 1.6×10^{-5} . The strain and thermal sensitivities show an increase when the surrounding refractive index increases. These dependences rely on the influence of the surrounding refractive index on the effective index of the cladding mode. A noticeable nonlinear behaviour of the thermal response is found when the surrounding refractive index increases towards the fibre cladding index. This behaviour is attributed to the combined effects of the device's response to the temperature and refractive index.

Keywords: cascaded long period grating, fibre sensor, CLPG thermal and strain response

Print publication: Issue 10 (October 2007)

Received 26 December 2006

Published 12 September 2007

[PDF \(474 KB\)](#) | [References](#)