



Nanyang Technological University

Network Technology Research Centre

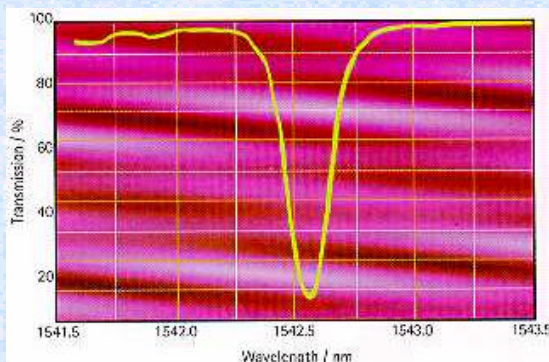


Fibre Bragg grating fabrication using coated optical fiber

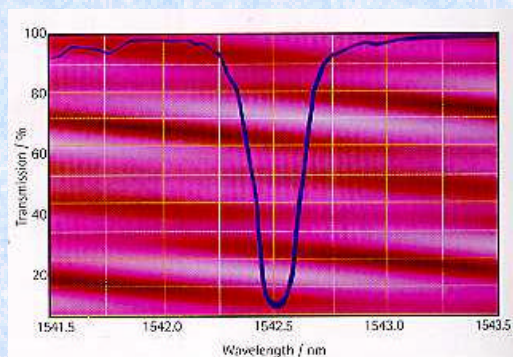
A **fibre Bragg grating** is basically a periodic perturbation of the refractive index along the fibre length, which is formed by exposure of the core to an intense optical interference pattern. It has found many applications in optical communication and sensor systems. In the normal process of fibre grating fabrication, the fibre coating must be stripped off before it is exposed to 248nm or 193nm UV light to form the fibre grating. In order to preserve the mechanical strength of the fibre, the fibre must be re-coated soon after the grating is written. This method is both time consuming and reduces the fibre strength due to exposure of the bare fibre to the air. To solve the problem, a number of solutions have been proposed. These include the following:

- 1) using a specially developed UV-transparent polymer coating,
- 2) writing the grating using near UV light around 330nm instead of at more conventional wavelengths,
- 3) writing on-line as the fibre is being pulled, and
- 4) using a specially developed coating which can be removed thermally then immediately reapplying the coating in an automated production system.

In this project, we demonstrate for the first time writing of a fibre grating through a normal off-the-shelf fibre coating using a wavelength of 248nm. The ability to write through the fibre coating is very useful since it will significantly simplify the grating writing process, particularly for long arrays of gratings as required for fibre sensors. At the same time the longer possible writing time will allow more complicated grating structures to be written. This is important for WDM devices and some sensor applications. The better heat resistance not only means that it can be used in many different applications but also allows the grating to be annealed if there is such a requirement, e.g. after hydrogen loading. A patent on the grating writing technique has been filed.



Transmission spectrum of Bragg grating written in coated fibre



Transmission spectrum of Bragg grating written in uncoated fibre