Surface roughness and the sensitivity of D-shaped optical fibre sensors

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Abstract

In this paper, the surface roughness characteristic of D-shaped optical fibre sensors with its effects on the sensitivity has been studied. The ULTRAPOL end and edge polishing system was used with some modifications to fabricate the D-shaped sensors with planar sensing zone from the single-mode optical fibres. The mean surface roughness of 343, 96, 25 and 9nm was estimated at the sensing zone of the D-shaped sensors which were sequentially polished with 30, 9, 3 and 0.5 mu m grit size polishing films, respectively. From the experimental results, it has been observed that surface roughness of the sensing zone does not exhibit the significant effects on the output signal strength, whereas the sensitivity of the D-shaped sensors nonlinearly related with the surface roughness of the sensing zone. The designed D-shaped optical fibre sensors have potential applications in biomedical and chemical industries.

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