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Title: Novel Microstructured Optical Fibres fabricated in Polymer

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Abstract:

Microstructured optical fibres (also known as “Photonic crystal fibres” or “holey” fibres) were first developed in 1996 and have subsequently generated enormous interest. Important features associated with such fibres are their ability to remain single-moded over a very large frequency range, to be single-moded with a large mode area, the ability to guide light in air and the ability to control the polarisation, dispersion and nonlinear properties by varying the hole structure.

Until last year, all microstructured optical fibres had been fabricated in glass. Last year our group, almost simultaneously with a group in Korea, succeeded in producing microstructured polymer optical fibre for the first time. Microstructured Polymer Optical Fibres (MPOF) do not need to be fabricated by capillary stacking and as a consequence offer the possibility of greatly extending the range of structures that can be fabricated, as well as the range of possible materials.

We have fabricated single-mode MPOF with the conventional hexagonal arrangement of holes, and ring-structured fibres in which the holes are arranged on concentric circles. In this paper, recent progress in MPOF fabrication is reported, including the experimental investigation of photonic band gap (PBG) guidance in MPOF with an air core, similar to that observed in silica microstructured fibre. Other novel designs to be discussed include fibres designed for polarisation control and large area multi-mode fibres.