

Extrusion of high nonlinearity single-mode holey optical fibers

K.M. Kiang*, K. Frampton, T.M. Monro, M.N. Petrovich, R. Moore, J.H. Lee, Z.

Yusoff, J. Tucknott, D.W. Hewak, H.N. Rutt, D.J. Richardson

Optoelectronics Research Centre, University of Southampton, Southampton, UK

Abstract : Holey fibers with high nonlinearity have great potential for the development of a compact devices based on nonlinear effects operating at low power. Holey fibers have been made conventionally by stacking of capillaries. We have used a novel extrusion method to produce microstructured preforms and we have successfully fabricated the first microstructured single-mode non-silica glass fiber.

Good dimensional control and surface finished of preforms can be achieved through the optimization of the extrusion parameters such as temperature, pressure, shear strain rate and die design. Hence die swell and "melt fracture" are avoided.

The microstructure holey fiber is fabricated by canning of the extruded microstructured preform. The cane is inserted to the extruded jacket tube and the assembly is drawn into fiber. The measured effective nonlinearity $=540 \text{ W}^{-1}\text{km}^{-1}$. Which is more than 500 times larger than standard silica fiber.

K.M Kiang: kmk@orc.soton.ac.uk

K. Frampton: kef@ecs.soton.ac.uk

T.M. Monro: tmm@orc.soton.ac.uk

M.N. Petrovich : mnp@orc.soton.ac.uk

R. Roger: rcm@orc.soton.ac.uk

J.H. Lee : jhl@orc.soton.ac.uk

Z. Yusoff: zuy@orc.soton.ac.uk

J. Tucknott: jat@orc.soton.ac.uk

D.W Hewak: dh@orc.soton.ac.uk

H.N.Rutt : hr@orc.soton.ac.uk

D.J. Richardson: djr@orc.soton.ac.uk