MANUFACTURING THE FUTURE CONFERENCE 2012

Title of the Presentation: **Manufacturing of High Performance Hollow Core Microstructured Optical Fibres**.

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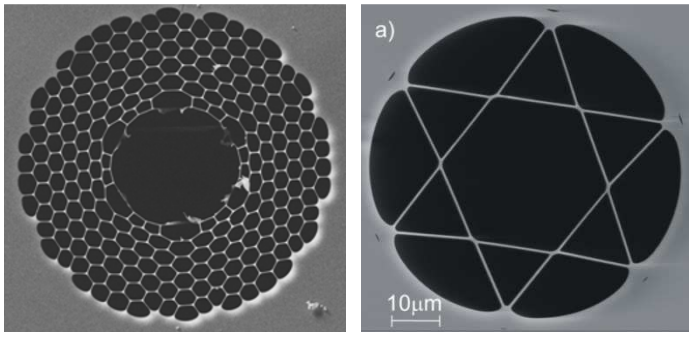
Abstract

Although fabrication technologies of Microstructured Optical Fibres (MOFs) fibres have matured at an impressive rate over the past ten years, these fibres are widely perceived as "challenging" and some key issues are still outstanding in order to improve their manufacturability. One such issue revolves around methods to improve structural control during the fibre draw. Structural control is of particular importance for certain types of microstructured fibres, such as hollow core Photonic Bandgap Fibres (PBGFs) and Anti-resonant (AR) fibres (also known as Kagome fibres). These fibres exploit resonant and/or anti-resonant guidance mechanisms and thus their transmission properties depend on the structure to a much greater extent as compared to conventional fibres. Hollow core MOFs have been identified as promising media for applications such as low latency (speed-of-light-in-air) communications, fibre sensing (chemical sensing, gyroscopes, sensors based on distributed scattering), laser power delivery (both high-peak and high average). However the successful implementation of these fibres in advanced demonstrators leading to commercial devices has been hindered by high cost, poor consistency and, in some instances, by lack of fibres with sufficiently good properties. We are actively investigating methods to improve structural control during the fibre draw and methods for scaling up the current manufacturing yields. Here we present recent progress in the fabrication hollow core MOFs at the Optoelectronics Research Centre; in particular, we report the fabrication of ultra-low loss (~few dB/km), wide bandwidth (>150nm) Photonic Bandgap Fibres and anti-resonant Hexagram Fibres with broadband low loss transmission suitable for the delivery of extremely high peak optical powers.

(The figure below shows a Photonic Bandgap Fibre (L) and an anti-resonant Hexagram Fibre (R))



Significance Statement: **The paper describes significant progress in the manufacture of the most challenging types of microstructured fibres, including the fabrication of fibers with unprecedented optical properties alongside strategies towards simpler structures which will ultimately improve significantly their manufacturability**.