Silica-based Air-clad Fibres: Parameters for Manufacturing

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In recent years, photonic crystal fibres (PCF) have attracted much interest because of their unique possibilities in mode selection. They allow high index as well as low index core geometry and light guidance is provided either by modified total internal reflection or by the photonic bandgap.

Today, a variety of PCFs are commercially available, manufactures, however, are rare. Although PCFs have been available for half a decade, very little information is found on the process parameters in fibre drawing of PCF preforms. For manufacturing PCFs of non-commercial shapes, it is nevertheless necessary to have these data available.

Here, we present parameters for drawing air-clad fibres. The silica preform consists of a central rod surrounded by six tubes, all packed into a larger tube (Fig. 1). Fibres have been drawn with various furnace temperatures, drawing forces, and pressures. An appropriate set of parameters has been determined which allows drawing of the aforementioned air-clad fibres (Fig. 2). Suitable parameters are a furnace temperature of 1750°C, a drawing force of 0.25 N, and a pressure of 10⁴ Pa. An air-clad fibre produced with this set of parameters already shows guiding of light Fig. 3.

Fig. 1: Scheme of the used	Fig. 2: Electron	Fig. 3: Guiding of the fibre
silica-glass preform.	micrograph of the drawn	at 632 nm
	fibre	

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