Abstract: **Switchable waveguiding in various liquid crystal-filled fibers**

Switchable waveguiding is summarized for several types of microstructured fused silica fibers with solid core and parallel, liquid crystal-filled microchannels. In order to achieve low attenuation, anchoring agents are required in liquid crystal-filled fibers with an array of microchannels that surrounds a solid core. The waveguiding properties of the solid core depend strongly on the anchoring condition inside the liquid crystal filled microchannel [1]. Efficient electro optic modulation can be achieved by realigning the liquid crystal using a two- or four-electrode setup[2].

Lower attenuation and faster response can be achieved by using a step index fiber with a centered Ge-doped core and a single microchannel [3]. If the microchannel is filled with a high index material, a second waveguide is created. These two waveguides couple evenescently at those wavelength, where their dispersions match. Thereby, the attenuation of the fiber is selectively enhanced at several wavelength, which can be very useful to create refractive index sensors for isotropic liquids [4]. If filled with a liquid crystal, the attenuation of such fibers is much lower than in fibers with numerous liquid crystal filled microchannels even without the use of anchoring agents. Compared to fibers with an array of microchannels, the amount of liquid crystal needed is two orders of magnitude smaller, if only a single channel is filled.

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