

Advances in special optical fibers

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The main issues and greatest challenges for the development of new photonic glasses materials and optical fibers are related to several aspects, from their synthesis to their shaping and integration into photonic devices. New drivers have arisen in recent years for the exploration and development of new technologies related to glass science: i) the photonic band-gap effect, ii) the production of nanostructured materials and iii) the incorporation of nanoparticles in glass matrix. Based on these aspects, we will discuss on the development of novel optical glasses based on silica, heavy oxide glasses and their impact on various fields of application such as information technology and biomedical devices.

Also, I will present a novel textile fabric integrating unobtrusive multi-material fibers that communicate through 2.4 GHz wireless networks with excellent signal quality. The conductor elements of the textiles are embedded within the fibers themselves, providing electrical and chemical shielding against the environment, while preserving the mechanical and cosmetic properties of the garments. These multi-material fibers combine insulating and conducting materials into a well-defined geometry, and represent a cost-effective and minimally-invasive approach to sensor fabrics and bio-sensing textiles connected in real time to mobile communications infrastructures.