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# Design of oxide glass composition for laser structuring and fiber manufacturing

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## Abstract

Direct Laser Writing (DLW) using IR femtosecond laser is offering new opportunity for fabrication of advanced components and devices by mixing both top down and bottom up material processing approaches. Oxide glass are of particular interest due to their intrinsic high transparency in the visible and the near infrared range. Laser structuring allows controlling different scales at once. Indeed, the control of micro- and nano-structures for photonics using laser/material interaction is challenging and relies on the control of the local electron/hole trapping, phase separation and diffusion processes.

One of the interest of glass is the possibility of modifying and adapting the material composition. Femtosecond laser structuring applied to silver-containing tailored glass allows creating a variety of photo-induced species or nanoparticles depending on the laser parameters but also the material glass composition. Unique three-dimensional optical structures with linear and nonlinear optical properties exhibiting dimensions below the diffraction limit becomes accessible [1, 2, 3].

Pristine glass structures has an important impact on the photo-induced modifications. Introduction of rare earth in glass has been investigated in order to take advantage of the silver ions reactivity toward femtosecond laser exposure. The fabrication of photosensitive silver-containing glass fibers has been developed [4]. Correlations have been established between

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fiber architectures, materials chemistry and photonics properties.

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**Keywords:** phosphate, photosensitivity, fiber, laser writing