Ion- exchanged rare-earth doped amplifiers and lasers

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With the development of optical telecommunication systems, there has been a huge work dedicated to integrated optics devices, which entailed the development of several technologies ($LiNbO_3$, III-V, SiO_2 on Si, Si photonics etc.). Among them, ion-exchange on glass has been successfully used for more than twenty years to realize integrated optics devices such as wavelength multiplexers, phasars, splitters, optical amplifiers, lasers or sensors. In this paper, we will review how this technology has been successfully used at IMEP-LaHC (Grenoble, France) to realize active devices based on rare-earth doped materials.
A short presentation of the technology will first be made, then ion- exchanged and Hybrid optical amplifiers will be presented. After that, the realization of stable narrow-linewidth DFB lasers, laser matrices and Q-switched lasers will be addressed. The talk will end with the presentation of current projects and their perspectives.