

Dielectric Waveguide Lasers

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This contribution reviews our recent results on planar and channel waveguide lasers in the dielectric oxide materials Ti:sapphire [1] and rare-earth-ion-doped potassium yttrium double tungstate (KYW) [2]. Generally, waveguide fabrication methods can be divided into two groups [3]. One approach exploits thin-film deposition methods to achieve planar surface waveguides, followed by surface structuring methods to achieve rib or ridge channel waveguides. The other approach exploits direct refractive-index modifications in bulk material. We have employed fabrication methods such as liquid phase epitaxy [4, 5] and reactive ion etching [6, 5] (first approach), as well as ion beam implantation [7] and femtosecond laser writing [8] (second approach). As a result, we have obtained surface [9] and buried [10] channel waveguide lasers in Ti:sapphire near 800 nm and planar waveguide lasers in KYW:Yb³⁺ near 1 μm [4], and KYW:Tm³⁺ near 2 μm [11]. This work was performed in a collaboration between the Swiss Federal Institute of Technology Lausanne, Switzerland, University of Southampton, UK, Max-Born-Institute, Germany, University of Lyon, France, and Politecnico di Milano, Italy.

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