

STRUCTURING OF SAPPHIRE BY LASER-ASSISTED METHODS, ION-BEAM IMPLANTATION, AND CHEMICAL WET ETCHING, A. Crunteanu, P. Hoffmann, and M. Pollnau, Institute of Applied Optics, Department of Microtechnique, Swiss Federal Institute of Technology, CH-1015 Lausanne, Switzerland; Ch. Buchal, Institut für Schicht- und Ionentechnik (ISI), Forschungszentrum Jülich, D-52425 Jülich, Germany.

Sapphire is an attractive material for micro- and opto-electronic systems applications because of its excellent mechanical and chemical properties. However, because of its hardness, sapphire is difficult to machine. Titanium-doped sapphire is a well-known broadly tunable and short-pulse laser material and a promising broadband light source for applications in low-coherence interferometry. We investigated several methods to fabricate rib structures in sapphire that can induce channel waveguiding in Ti:sapphire planar waveguides. These methods include direct laser ablation, laser-micromachined polyimide stripes, selective reactive ion etching, and ion-beam implantation followed by chemical wet etching. Depending on the method, we fabricated channels with depths of up to 1.5 μm . We will discuss and compare these methods. Reactive ion etching through laser-structured polyimide contact-masks has so far provided the best results in terms of etching speed and roughness of the etched structures.