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.