LBO and RTP crystal growth improvement leading to large and optically perfect material

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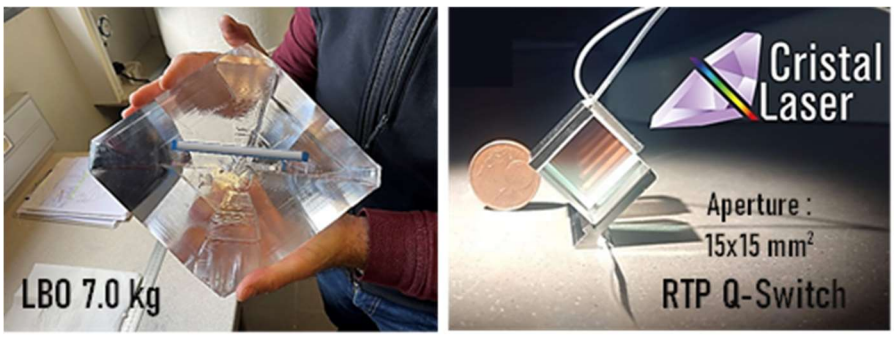
Crystallization of very large size boules has now become reality. Cristal Laser company has significantly improved growth conditions of lithium triborate (LiB_3O_5 - LBO) and rubidium titanyl phosphate ($RbTiOPO_4$ - RTP) crystals. That leads to reproducible increase the weight of LBO boules to 7 kg, and those of RTP to above 1 kg. The crystals are characterized by low density of inclusions and high optical homogeneity, low laser absorption and high laser damage resistance. These parameters were achieved using high purity chemicals, refined growth conditions and much patience, as the growth cycle can last up to 7 months. Thus, our fabrication processes have been adapted to large-aperture optics.

Large aperture LBO have shown an excellent efficiency for the second- [1,2] and third harmonic generation of nano-, pico and femtosecond pulses. Meaning 60-90 mm diameter optics, the Second Harmonic energy of 217J was achieved with 1053 nm nanosecond pulses [3]. And recently, a power of 1.4 kW at Second Harmonic (515 nm) in the ps regime was reported [4]. Last, femtosecond pulses (27 fs) have been frequency-doubled with an efficiency of 80% and a high contrast intensity of 10^{18} W/cm^2 [5].

The principal application of RTP is relatively low voltage (4kV/cm) and high contrast (>30dB) Pockels cells [1]. Such devices consist of two index-matched crystals and are thermally stable with no piezo- or pyro-effect artifacts over a -50/+70°C temperature range. Typically measured contrast is 30-32 dB or better, with values of 38-40 dB recorded after a very fine alignment. The switching frequencies of RTP cells can range from Hz to a few MHz under a high duty cycling.



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