

Ceramics micromachining with sub-nanosecond pulses

Résumé: the various tests performed have demonstrated the improvements from the ultra-short pulses delivered by Teem Photonics sub-nanosecond laser technology compared to standard nanosecond pulsed lasers.

Thanks to the reduced heating of the workpiece, it is now possible to :

- Scribe white ceramics like zircon without carbonization, which spares from time and money consuming post-processes.
 - Increase scribing resolution down to sub-100µm range
 - Avoid micro-cracking, even in the challenging case of thin sample deep engraving.
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Technical Data

Laser: PicoSpark 1064nm (HNP)

Power : 5.5 W

Repetition rate : 50 kHz

Pulse width : 650 à 700 ps

Optics :

Galvanometer : ProSeries 10mm (modèle 61710PSLCH1-YH)

F-theta lens : 56mm + 100mm

Software :

Lens : V 2.7.0

Experimental results

White zircon

When processing white zircon, scribing happens without carbonization, which is impossible with nanosecond lasers.



Left : sample right after processing

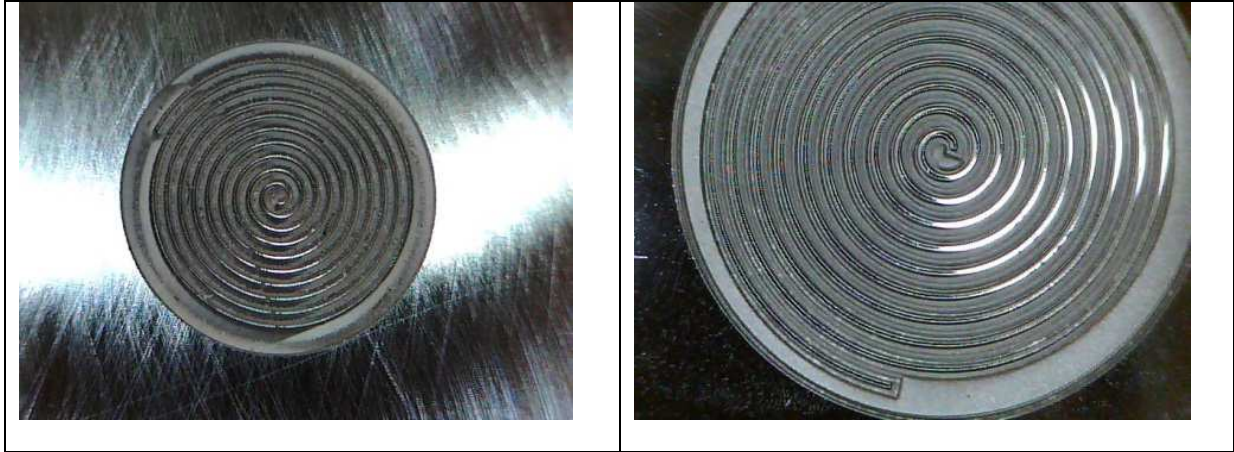
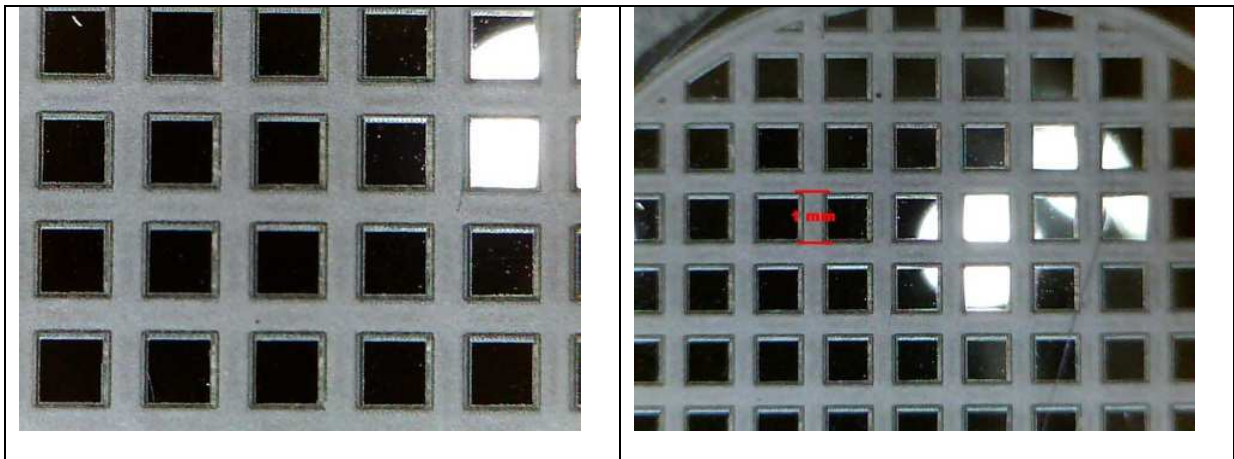
Below : sample after a cleaning with ethanol



Black zircon

On a 300µm thin black zircon sample, the minimal heat effects during processing allow to deep engrave down to 100µm without any micro-cracking.



5mm diameter serpentine cut in black zircon with 1/10mm1mm squares engraved in black zircon with 500µm spacing**Aluminium oxide ceramics**

Thickness : 0.25mm

The limited heat effects during machining have permitted to drill this 300µm diameter hole in a 1mm square sample without any microcracking.

