



# HOW TO ADD VALUE TO YOUR MATERIALS AND INDUSTRIAL PRODUCTS WITH LASER TECHNOLOGY?

Lasers are an alternative technology for the development of industrial products. Their ability to focus a high power on a small area allows lasers to act on the matter with extreme precision while maintaining high efficiency.

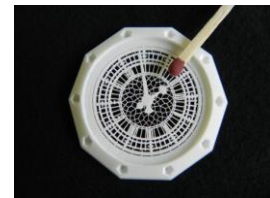
As part of its technological platform **HAINOLASE** dedicated to the treatment of materials (ceramics, glass, metals, polymers) by lasers, the CRIBC work focuses on the understanding of the fundamental aspects of laser / material interactions and the development of **industrial applications** (benefits service and proof of concept) for **subtractive processes** (marking, patterning, exfoliation, ...) and **additive processes** (cladding, melting and selective laser sintering).

The main characteristics of the HAINOLASE laser equipments are:

	Processes				
	Subtractive			Additive	
$\lambda$ (nm)	248	1064	1064	1070	1061
$P_{max}$ (W)	$3 \times 10^6$ /pulse (6ns)	<ul style="list-style-type: none"> <li>• 150 (cw)</li> <li>• <math>40 \times 10^3</math> / pulse (5ns)</li> </ul>	<ul style="list-style-type: none"> <li>• 20 (cw)</li> <li>• <math>&gt; 60 \times 10^3</math> / pulse</li> </ul>	200	1000
axis	X, Y	X, Y, Z, $\theta$ , $\varphi$		X, Y, Z	X, Y, Z, $\theta$

## OUR SUBTRACTIVE LASER PROCESSES

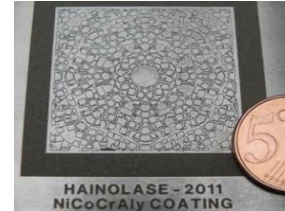
Our equipments allows the **cutting, texturing and shaping** of ceramics (oxides, carbides and nitrides) with less than  $10\mu\text{m}$  accuracy while minimizing the appearance of defects. The 3D machining of meso-scopic objects is also possible via the proprietary process of CRIBC (international patent WO/2012/164025) for the **high speed and high resolution laser milling of ceramic green bodies**. Objects with complex shapes and of several centimeters can be manufactured in a few minutes, positioning the laser as a competitive alternative to the micro milling of fragile materials.



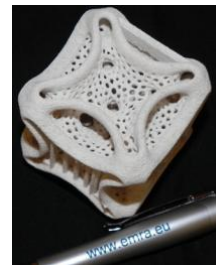
## OUR ADDITIVE LASER PROCESSES



Beside its expertise for marking, tableware design coatings, high value glass coatings... the CRIBC masters the realization of industrial technical coatings such as wear resistance, corrosion resistance or electro-conductivity. High power lasers allow to sinter and/or melt metallic, ceramic or composite powders. The obtained coatings have a thickness varying between a few  $\mu\text{m}$  to a few mm with a selectivity of about  $100\mu\text{m}$ . The laser energy is applied only on required areas thus providing **efficient industrial** processes.



The CRIBC uses laser technology for the **prototyping and rapid manufacturing of 3D** complex parts. This process allows to produce **3D near net shape** parts layer by layer from a powder bed. As a consequence, items that cannot be processed by other techniques can be manufactured. The main scope studied at the CRIBC is the manufacturing of ceramic complex 3D shapes.



Lasers have various application fields:

- **Micromechanics:** MEMS, wear resistant coatings, watch industry, turbines...
- **Biomedical:** dentistry, bone filling, traceability...
- **Electronics:** electro conductive coatings, semiconductors, sensors, interdigitated electrodes...
- **Information / Decoration:** manufacturing parts from CAD files, custom marking, traceability and anti-counterfeiting...

**Interested in discovering the potential of our platform and in exploiting our expertise in this field?**

**Do not hesitate to contact our team who is ready to support your processes and products developments.**

### Contact

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