

## For MILEDI Project- ENEA Frascati- Equipment for Laser Patterning

The laboratory of photonics and nanomaterials at ENEA research center of Frascati (Rome, Italy) is provided by a Laser Patterning Machine (manufactured by Optoprim Monza) equipped with a UV laser. The laser technology offers the possibility to pattern the surfaces of different substrates and represents a useful strategy to induce the *in situ* growth of new nanomaterials.

By tuning the power and frequency of laser pulses and by using proper precursors, it is possible to obtain materials with different chemical and physical properties. For the MILEDI project the laser technology is functional for the formation of luminescent semiconductor quantum dots (QDs) directly in a polymeric matrix. The as-produced nanocomposites materials open the way to many application in the field of micro LED (mLEDs) and micro OLED (mOLEDs) array manufacturing, photovoltaic devices and biological labels.

In the figure below is reported the Laser Patterning Machine configuration.

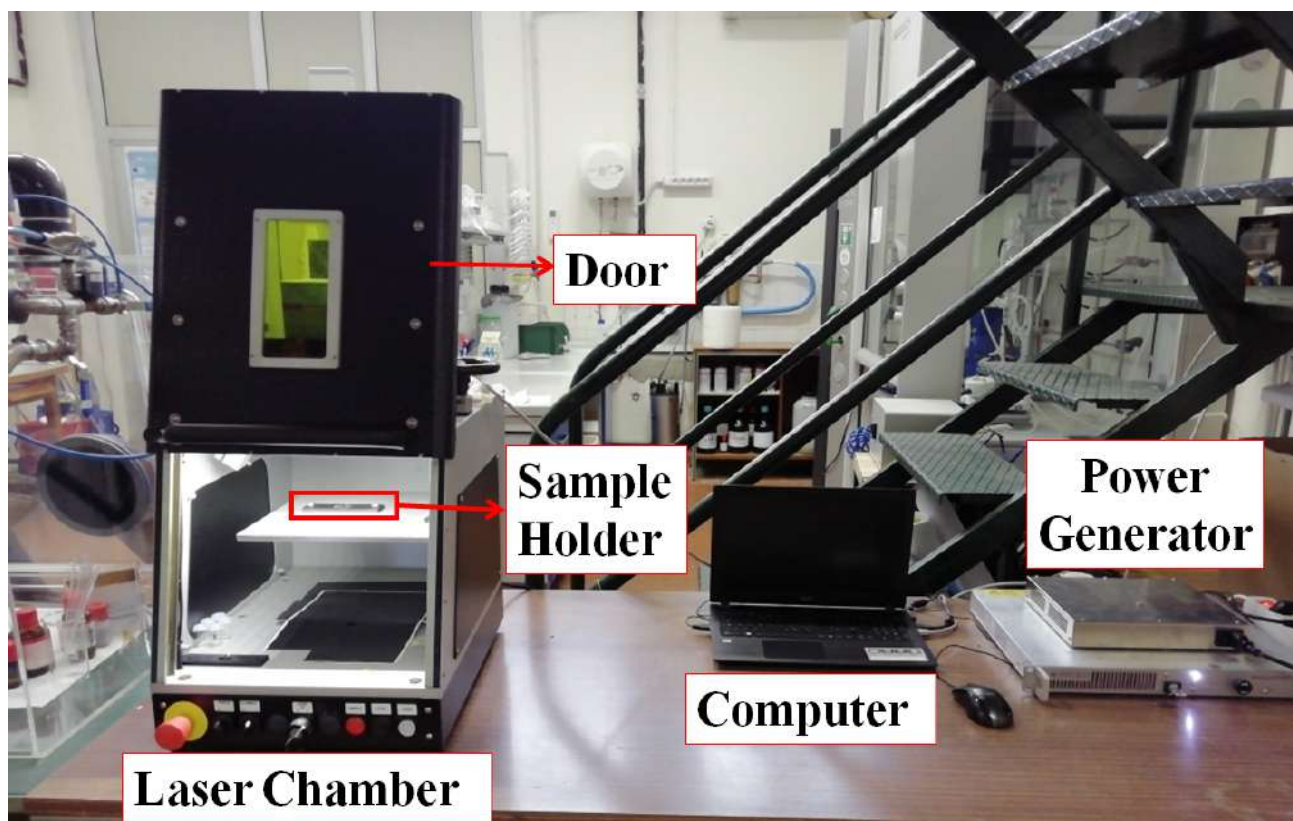


Figure 1. Laser Patterning Machine (Optoprim) setup at ENEA research center of Frascati.

As shown in Figure 1, the door of the chamber can be easily opened to introduce the substrate in the sample holder. The UV laser is connected with a PC equipped by EXcad software for experimental design. This program allows the operator to draw graphical models to be printed by the laser directly on the substrate surfaces.

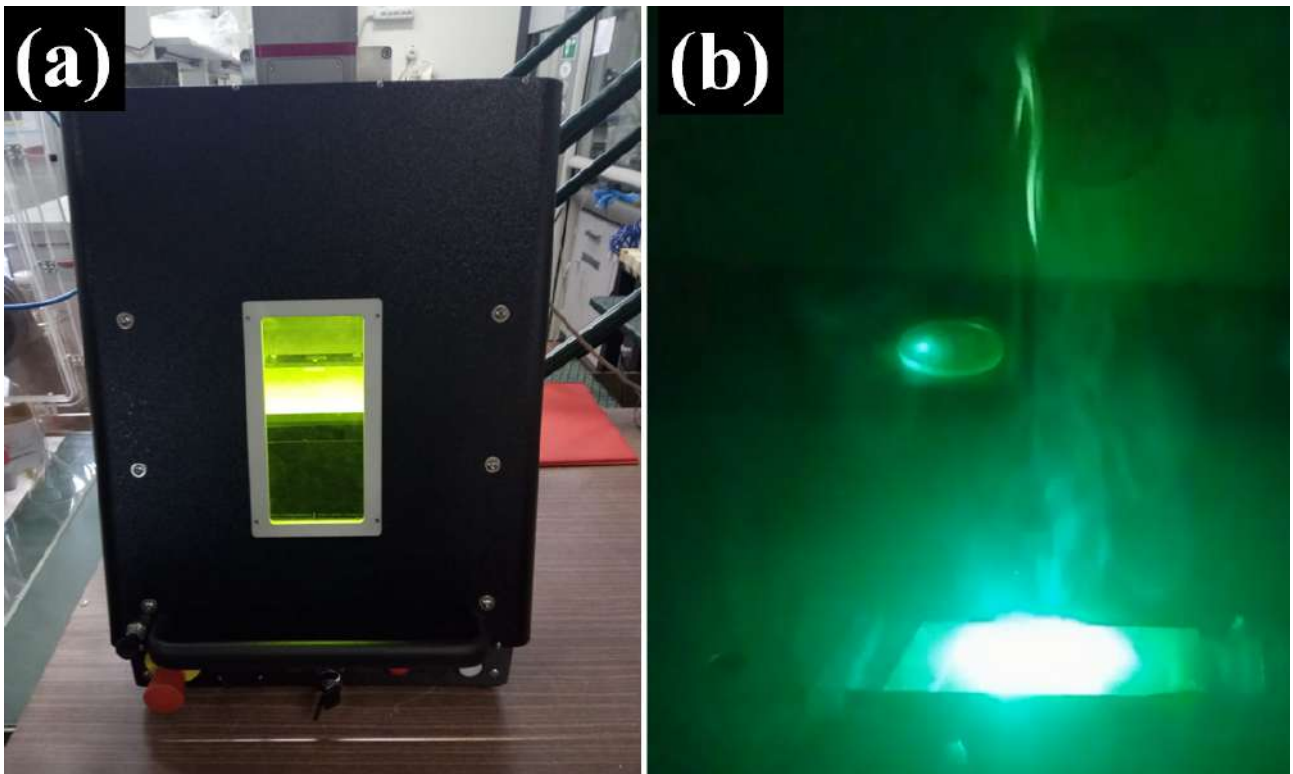


Figure 2. Photo of (a) Innolas Mosquito laser chamber locked and (b) particular of the laser patterning process.

As depicted in Figure 2(a), the laser patterning procedure starts when the door is locked. The confinement of the laser radiation into the chamber allows to safely monitor the whole process by the special glass of the door. In the Figure 2(b) is shown a photo taken during the patterning step.



Figure 3. Photos taken from patterned substrates of different materials

To emphasize the potentialities of the laser based technologies, examples of patterned substrates of different materials are shown in Figure 3. The scalability of the patterning process on the large area makes this route particularly suitable for industrial applications.