PULSED LASER DEPOSITED MICRO-STRUCTURES INTEGRATED ON SI SUBSTRATE

LABORATORY : Institut Lumière Matière
IN COOPERATION WITH : inl

LEVEL : M2
TEAM(S) : MNP

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SCIENTIFIC CONTEXT :

In this project, we want to develop new integrated materials on Si substrate made by Pulsed Laser Deposition and liftoff processing. PLD is a high quality growth technique [1] commonly used for many applications in photonics which can provide for instance low loss waveguides grown at room temperature [2]. In PLD, an intense pulsed laser beam is focused through an optical window on a solid or liquid target under vacuum. If the target absorbs enough energy, the laser-material interaction the laser-material interaction leads to the formation of a plasma consisting of partially ionised species directed perpendicularly to the target surface, which can deposit on the substrate facing the target. It has the advantage that the molecules reaching the surface have an energy which can exceed the thermal energy which allows to envision lift-off processing for a fast integration. The principle of this technics is presented in the Figure 1-a. Recently, we have shown that rare earth doped waveguides and grattings can be made by combining PLD and liftoff processing [3,4,5]. The Figure 1-b presents the first obtained waveguide [3]. Such results are extremely promising since they open a way to new materials integration on Si platform. However, we want now to optimize the material and processing to improve the device resolution for practical applications.

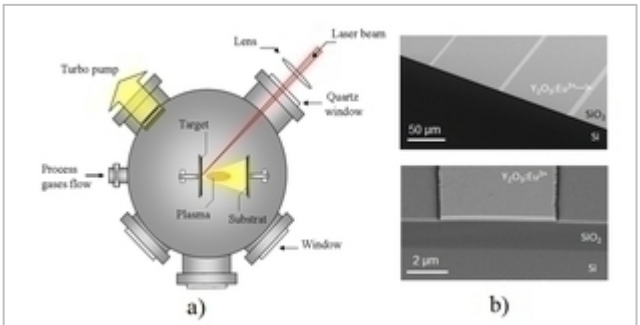

Figure 1 : a) Pulsed Laser Deposition (PLD) at ILM and b) micro-strip made in PLD layer

MISSIONS :

For this internship, the candidate will be in charge of the lithography step in the NanoLyon clean room managed by the Institute of Nanoscience in Lyon (INL) and the PLD growth at the Institute Light Matter (ILM). The different growth and lithography parameters will be studied in order to developed high aspect ratio micro-structures. The fabricated devices will be measured mainly by atomic force and secondary electron-microscopies and by photoluminescence measurement.

OUTLOOKS :

This internship could be continued with a phD work.

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