**The Plasma Plume Deflection and Target Surface Roughness During Pulsed Laser Deposition of Functional Oxides**

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Pulsed laser deposition (PLD) is a highly flexible, fast and reproducible physical vapor deposition technique that uses a pulsed laser to ablate a target material, producing an excited laser-induced plasma. The ablated material condenses onto a substrate. PLD allows for direct control of growth parameters such as laser pulse frequency, laser fluence, pressure and ambient gas mixture. Although simple to set-up, the ablation process is difficult to model because of its non-equilibrium nature due to the high pulse energy incident within a short laser pulse duration (typically 20 ns for excimer lasers)[1].

Ablation of any target material requires optimization of the process parameters.

Some targets used in PLD develop a rough surface structure after prolonged use, which causes the plasma plume to permanently deflect toward the incident laser beam during the ablation process. Typically, the plume deflection increases until a stable surface morphology is reached[2].

In this work, we present a correlation of the plasma plume deflection during the deposition process with the target surface roughness and morphology after the deposition from different ceramic metal oxide targets. The target surface roughness and topography are measured by laser scanning microscopy. The plasma plume deflection is evaluated from images captured by a camera. The deflection angle is determined utilizing a Python script that uses image moments to calculate the angle of the plasma plume.

[1] M. Lorenz, Pulsed Laser Deposition, in digital Encyclopedia of Applied Physics, Wiley‐VCH (2019)

[2] A. Perrone, et al., Appl. Surf. Sci. 197-198 (2002) 251-256