

MASTER THESIS M2 CDM (5 months, Feb. - June)

2025-2026

Title of the project: Shot-peening and High Temperature Oxidation of Titanium**Supervisor(s):** Virgil Optasanu (McF, HDR, virgil.optasanu@ube.fr)

Location/ Laboratory / Department / Team: ICB / PMDM / M4OXE

Collaborations: Ioana Popa, Luc Lavisce**Summary:****Context**

Our research group has shown that mechanical surface treatments such as shot peening and laser shock peening can improve the oxidation resistance of titanium and its alloys at high temperature. These results have been published in more than ten scientific articles. Shot peening, for example, induces severe deformation of the surface layers, creating microstructural features such as grain fragmentation, twins, and high defect densities.

Internship Objectives

The goal of this project is to better understand how the microstructure of Ti and Ti alloys evolves during short-term exposures at elevated temperatures (650–700 °C) under different atmospheres (Ar, O₂, or air).

Approach

- Perform controlled high-temperature exposures in furnaces or thermogravimetric analyzers.
- Prepare samples for characterization
- Characterize microstructural changes using XRD, SEM/EBSD, and nanoindentation.
- Analyze parameters such as microstrain, dislocation density, nanohardness, and elastic modulus.

Student Learning Outcomes

Gain hands-on experience in high-temperature testing and surface treatments.

Acquire skills in advanced characterization techniques.

Learn how to process and interpret experimental data.

Perspectives

This Lab Project is the starting point of a larger research program. It may possibly be extending into a fully funded PhD project.

Type of project (theory / experiment): mainly experiment and data analysis**Required skills:** mainly experiment and data analysis

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