

Post-doc Position

Fourier Ptychography Microscopy for in-situ microstructured surface characterization

Duration: 18 months, starting from october or later.

Group: Lab Hubert Curien (LabHC), Manutech-USD, in St-Etienne, France

Background

The postdoctoral position addresses the need for **in-situ characterization**¹ of surface microstructuring by laser as well as the wetting contact angle of this type of surfaces at the (sub) micrometric scale (see Figure 1). Due to the large working distance of laser structuring machines, it is not possible to characterize the treated surface with a satisfactory resolution using conventional optical imaging. Thus a time costly ex-situ observation is usually conducted under dedicated high resolution surface characterization environments such as SEM, AFM and so on.

PtychoLaser therefore proposes to implement the Fourier Ptychography Microscopy (**FPM**) technique² in order to achieve in-situ quantitative high resolution surface characterization with a large working distance. FPM makes it possible to obtain a full-field image ($\sim\text{cm}^2$) with micrometric resolution through a lens at a long working distance ($>\text{cm}$) thanks to high-angle sequential illumination associated with reconstruction in Fourier space. In addition, FPM preserves the large field of the observation lens and makes it possible to retrieve the phase information to assess the relief of the microstructuration (topography, roughness, triple line thickness) offering a real **technological leap** for in-situ characterization of both wet contact and laser surface structuring. The project involves three academic partners (LabHC, LTDS, Manutech-USD).

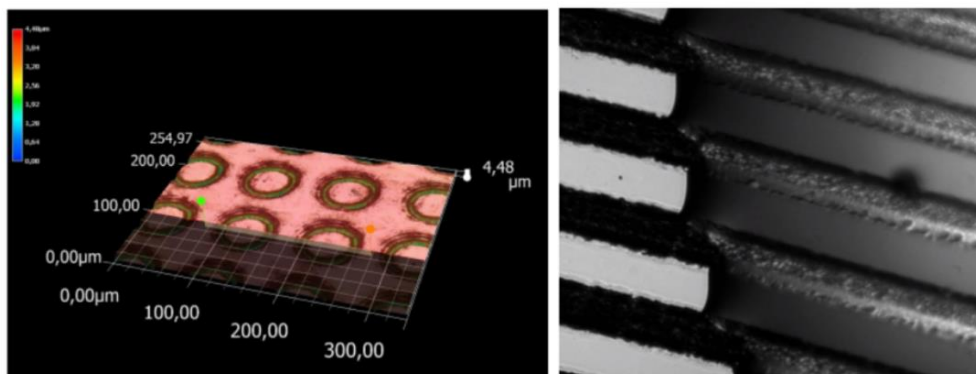


Figure 1: left, Laser-structured surface at the microscale . Right, Laser-structured surface wetting Pictures from Lab H. Curien and LTDS

Candidate's profile

Given the multi-disciplinary nature of the research, the successful candidate must be a team player, results-driven, and self-initiator. He/she should hold a doctorate degree in optics/imaging, with a good

track record on some of this topics: imaging, optical characterization, microscopy, laser material interactions. Computing skills are naturally awaited for the image reconstruction in the Fourier domain (Matlab). Sufficient skills in material science are also required to ensure a good level of exchange with partnership. To this end, knowledge in French (or high motivation for learning) is considered as an advantage.

Practical information

Location: The hosting lab (Hubert Curien) is based in Saint Etienne, eastern central France. Saint Etienne city is of 3-hour's train distance from Paris, or 1 hour from Lyon. It is also near the Pilat massif and the Alps, close to excellent hiking trails and ski resorts.

Remuneration: monthly salary 2000~2500E, depending on experience and skills.

Contacts:

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References

- 1: A Aguilar, C Mauclair, N Faure, JP Colombier, R Stoian, Scientific reports 7 (1), 1-10, 2017
- 2: Zheng et al. Nature Photonics, vol. 7, pp. 739–745, 2013