MSCA Post-doctoral fellowship candidate in micro-processing for photonics

LABORATORY / LABORATOIRE *: iLM Instituts Light Matter

IN COOPERATION WITH / EN COOPERATION AVEC : INL Institute Nanotechnology Lyon

TEAM(S) / EQUIPE(S) *: ILM-MNP

WORK PLACE / LIEU DE TRAVAIL *: Villeurbanne

CONTRACT TERM / DUREE DU CONTRAT *: 24 months

EXPECTED START DATE / DATE DE PRISE DE POSTE PREVUE *: 01/09/2027

WORK QUOTA / QUOTITE DE TRAVAIL *: 100%

SALARY / SALAIRE *: 3.6k€/month net

FUNDING / FINANCEMENT *: Marie Curie

LEVEL / NIVEAU D'ETUDES *: Post-doc position after a PhD

CONTACT(S) *: alban.gassenq@univ-lyon1.fr
CONTACT(S) DETAILS *: Associate professor, ILM

KEYWORD(S) / MOT(S) CLÉ(S) : Photonics, 3D Lithogaphy, Processing, Clean Room

SCIENTIFIC CONTEXT / CONTEXTE SCIENTIFIQUE *:
In the frame of a collaboration between the ILM in Lyon, the Astrophysics Laboratory of Marseille (LAM) and the Lyon Institute of Nanotechnology (INL), a 2 years post-doc position is envisioned through the COLALA Project (COnvex surfAce grating deveLopment for Astronomy). This collaborative project aims at developing an innovative technological solution for manufacturing high efficiency blazed gratings on convex surfaces for advanced next-generation space instruments.

MISSIONS *:
In this project, the researcher will develop the technological process for writing first a grayscale 1D structure on flat surface according to a Graphic Design System (GDS) design file edited using python programing and laser lithography. In order to qualify the technological results, morphological characterizations will be performed using Atomic Force Microscopy (AFM) and optical profilometer. Back-and-forth comparisons between the fabricated devices and the lithography

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design will enable to adjust grating in terms of geometry: periodicity, height, blaze angle, roughness… After this initial study to adjust the resin parameters to meet the requirements of the blazed grating implemented on a flat surface, the researcher will develop a process for writing grayscale structure on a convex surface. As the lithography system allows an automatic focus adjustment, the GDS designs to reproduce the array on a convex substrate will be re-implemented. The fellowship could last for 12 to 36 months, depending on the type of Postdoctoral Fellowship.

OUTLOOKS / PERSPECTIVES :

New generations of instruments for observing the universe require breakthrough technological components. For instance, the "BATMAN" spectro-imager, developed at the Laboratory Astrophysics Marseille (LAM), is based on a MOEMS-based digital micro-mirror and a convex grating to disperse light, but the performance could be improved using blazed gratings [1]. Indeed, the low efficiency per order obtained with usual gratings can be improved using blazed gratings, but this requires technological development to make them on a convex surface. This grating is thus a key component for reaching unprecedented performance with this spectro-imager.

BIBLIOGRAPHY / BIBLIOGRAPHIE :

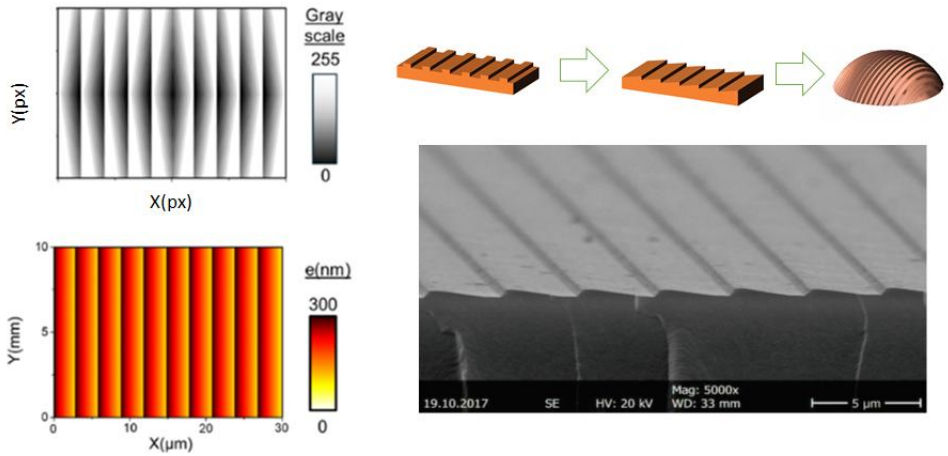
[1] F. Zamkotsian et al. "convex blazed gratings for high throughput spectrographs in space missions" Inter. Conf. on Space Optics 2023, Proc.127772J

[2] A. Gassenq et al. "Selective grating obtained by dye micro-structuration using a laser writer" Appl. Opt. 2020 59, 5697

[3] A Gassenq, et al. "Diffraction grating enhanced photoluminescence from etching-free erbium thin films" Opt Lett. 2023, 1:48(11)

[4] Nguyen Ha My Dang et al. "Nanoimprinted exciton-polaritons metasurfaces: cost-effective, large-scale, high homogeneity, and room temperature operation" Optical Materials Express 2024, 1:14(6)

IMAGE D'ILLUSTRATION :



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