Thesis Projet EIPHI-BFC

Job title	AMFRI - Mechanical and Frictional anisotropy of nanostructured thin films deposited by GLAD technique
Job type (PhD, Post-doc, Engineer)	PhD
Contract duration (months)	36 months
Qualifications (Master, Ph.D …)	Master
Job hours (full time/ part time)	Full Time
Employer	UBFC Université Bourgogne Franche-Comté
Financing Institutions	Graduate School Eiphi, Région Bougogne-Franche Comté
Host Laboratory	FEMTO-ST Institute, Applied Mechanics Department
URL Host Laboratory	https://www.femto-st.fr/en/Research-departments/APPLIED-MECHANICS/Presentation
Address Host Laboratory	24, rue de l'Epitaphe 25000 Besançon, FRANCE
Job description	The 'GLancing Angle Deposition' (GLAD) technique allows an extremely precise control of both the microstructure and composition of thin films. This technique consists in spraying atoms onto a substrate at a variable incidence. Thus, it is possible to produce thin films (100 nm to 1 µm thick) exhibiting original architectures at the micro and even nanometric scales. A thin film deposited by GLAD is therefore a microstructured and structured volume with its own mechanical properties. It is likely that the surface and volume structuring of GLAD films allows the development of a frictional anisotropy while ensuring a mechanical resistance compatible with tribological applications. To our knowledge, these properties have not yet been studied in detail. The understanding of their mechanical and tribological behaviors is therefore the focus of the proposed study. The PhD student will be trained on the GLAD deposition facilities to carry out the deposition. The study will then focus on: • the degradation modes under tribological stress (scratching, friction) and the existence of an anisotropy of the response of the thin films. • the mechanical properties controlling the degradation modes of the films identified at the previous step. This will be done mainly using Scanning Micro-deformation Microscopy (SMM) and nano-indentation techniques, • the tribo-chemical degradation modes, in particular the role of oxidation and/or other reactions of interest on the mechanical and tribological behavior of the GLAD thin films. This last point is directly related to the previous points but also involves the physicochemistry of the surfaces of the deposits. Eventually, we will try to propose an optimal architecture with regard to (i) the mechanical and tribological resistance, (ii) the amplitude of the gradient of frictional anisotropy generated by the contact.

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Candidate profile	Key disciplines: Mechanics, Materials, Surfaces Team oriented - Precision and rigor - Taste for experimental work - Ability to report on work - Ability to synthesize - Autonomy and initiative - Motivation and enthusiasm
Keywords	Thin films, micro-mechanics, tribology
Application deadline	April 15th 2021
Application Depending on the type of position	Duration: 3 years, starting in September/October 2021 Salary: approximately €1,666 net per month Teaching assistantship is possible if the PhD student wishes to do so Applicants are invited to submit their application to the PhD supervisor and Co-supervisor. Application must contain the following documents: - CV - Cover letter - At least 1 reference letter