Offer for a 12 months post-doc, thin film TEM characterization

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Context :

Ceramic Matrix Composites (CMCs) is a relatively recent class of materials, whose developments initially come from the space sector and also from aeronautics, civil and military, land transport and energy as refractory structural parts (https://gdr-cmc2.cnrs.fr).
There is currently a strong need for high-performance CMCs operating above 1100 ° C in an oxidizing atmosphere. For this, a ceramic matrix operational up to 1900 °C is available (patent of the industrial partner), but no fiber reinforcement. The production of high performance fibers, compatible with these needs and at a competitive cost is a technical but also a strategic objective in a world oligopoly context, dominated by Japanese and American competition. Carbon fibers are good candidates, provided their resistance to oxidation is improved by a surface treatment process with high application potential. This is the objective of the collaborative project between an industrial partner and several academic teams, in which this post-doctorate offer fits.
The job offer covers the morphological and structural investigation of screened oxidation barrier ultrathin coatings applied on such fibers and on similar carbon materials selected on purpose. This investigation concerns the carbon / coating systems, both as processed by ALD and PVD routes and after oxidation treatments that reproduce the targeted operating environment. Particular attention will be paid to the extended and fine characterization of the coating (that will be either monolithic or architecture) and the carbon/coating interface by state of the art microscopy techniques, namely high resolution and scanning transmission electron microscopy and related spectroscopic techniques. The overall objective is to contribute to the development of both an original process for the surface treatment of C fibers and an efficient nanosheath for fiber protection.

Missions :
The contracted recruited will be hosted in the Interuniversity Materials and Engineering Research Center, CIRIMAT in Toulouse (https://www.cirimat.cnrs.fr/?lang=en) and will make regular missions to the East Paris Institute of Chemistry and Materials, ICMPE in Paris (https://www.icmpe.cnrs.fr/). He(she) will benefit from the technical and scientific environment of the two institutes and from the experience of the project team. In this context he(she) should :

- Establish a detailed work plan in collaboration with the project partners ;
- Propose a characterization methodology that will allow responding to the technological and scientific questions raised by these materials ;
- Participate to the implementation of high temperature mechanical and oxidation tests ;
- Carry out or support characterizations at CIRIMAT and the Castaing MicroCaracterization Center (https://ccarcastaing.cnrs.fr/) ;
- Carry out TEM characterizations at ICMPE ;
- Interact with, and report periodically to, the project team.

Profile :

- PhD in materials science or microscopy ;
- Knowledge in the characterization of nanometric films ;

- Experience in electron microscopy (SEM, TEM) and spectrometry techniques for the characterization of surfaces and thin films.

Main location :
CIRIMAT, ENSIACET, 4, allée Emile Monso, Toulouse - France
with regular one-week trips to ICMPE

Precisions :
Toulouse INP 12 months contract starting in May 2022
Remuneration : Gross salary : 2638 €/month

Application deadline : April 8, 2022 by sending CV and cover letter together to :

- Dominique Poquillon : dominique.poquillon@ensiacet.fr
- Léo Mazerolles : mazerolles@icmpe.cnrs.fr