

Post-Doctoral Researcher

Composites Advanced Manufacturing (POPCOM project)



Discipline : Advanced manufacturing processes of thermoplastic composites

Line Manager : Director of the Center for Materials and Process Engineering

Workplace : Research Center of IMT Lille Douai, 764 Boulevard Lahure, 59500 Douai, France

Context :

Created by the merger of Mines Douai and Telecom Lille on January 1st, 2017, **IMT Lille Douai** is the largest graduate school of engineering in the north of Paris. It aims at teaching the general engineers and digital experts of the future. Located at the crossroads of Europe, between Paris, London, Brussels and Amsterdam, IMT Lille Douai intends to become a major player in industrial and digital transformation of the society by combining engineering science and digital technologies.

Based on two sites dedicated to research and education in Douai and Lille, IMT Lille Douai has research facilities of almost 20,000m² devoted to high-level scientific activities in the following areas:

- Digital science,
- Energy and Environment,
- Materials and Process engineering applied to polymers, composites and civil engineering.

For more details, visit the IMT Lille Douai's website: www.imt-lille-douai.fr

The position is vacant within the Center for Materials and Process Engineering (<http://tpcim.imt-lille-douai.fr/>).

Missions : Composite materials are replacing rapidly metal counterparts in many transport sectors such as aeronautics, automobile and railway, by dint of their lightness and performance, as the call for the reduction of gas emission and of energy consumption is ever increasing. Nevertheless, the high cost, the lack of reliability and the immature mass production technologies have been major barriers to the widespread adoption of composite materials for structural applications. The project POPCOM (*Plateforme de développement pour l'Optimisation des nouveaux Procédés COMposites*) lead by IMT Lille Douai aims to address the aforementioned issues, within the framework of research program ELSAT2020 (*Ecomobilité, Logistique, Sécurité, Adaptabilité dans les Transports à horizon 2020*) co-financed by the European Union with the European Regional Development Fund, the French state and the Hauts de France Region Council.

In particular, the aim of this project is to optimize the advanced manufacturing technology covering the whole chain of design/manufacturing/evaluation using the POPCOM platform (<https://youtu.be/ZF5E9gUmaxM>):

- Optimization of mass production manufacturing technologies for thermoplastic structural composites (Thermoplastic RTM, Compression RTM, Thermoconsolidation of commingled yarns or film stacking, Overmolding ...)
- Development of virtual engineering tools (e.g. simulation of mechanical behavior of composite structures considering the influence from manufacturing process such as process-induced voids and fiber misalignment)
- Advanced characterization of composite materials (e.g. X-ray microtomography to analyze the residual voids in a final composite part or to construct a numerical mesh for RVE simulation and homogenization technique)
- Non-destructive evaluation and Structural Health Monitoring (SHM) of composite structures

Activities : The post-doctoral researcher will focus on the manufacturing and characterization of thermoplastic composites with high mechanical properties and high productivity for aeronautic and automotive applications. In particular, he/she will analyze and optimize the « process-structure-properties » relations considering the strong coupling among the resin flow, the heat transfer, the phase change (e.g. polymerization, crystallization) and the fiber deformation.

Candidate profile : PhD or doctorate degree in **composite materials** or polymer **processing technologies**. Strong expertise in manufacturing process, material science and rheology is mandatory. The deep knowledge in multi-physics phenomena during the manufacturing processes is highly appreciated. Good communication skill in both written and spoken English is also required.

Skills	Knowledge
<ul style="list-style-type: none"> • Composites manufacturing technologies (RTM, Compression RTM, Compression molding) • Mechanical characterization methods • Microstructure observation techniques (SEM, X-ray computer tomography, Optical microscopy) • Proficient English in speaking and writing 	<ul style="list-style-type: none"> • Material science on polymers and composites • Polymer rheology, Fluid mechanics (e.g. Porous medium flow), Heat transfer • Solid mechanics (e.g. Non-linear behaviors of fibrous or textile materials) • Basic knowledge of numerical methods

Conditions :

The job is open from 1st of February 2020 for a period of 12 month (temporary contract).

Information and application :

For any information on the missions, please contact **Prof. Chung-Hae PARK** (Professor, scientific and operational supervisor of the post-doc), chung-hae.park@imt-lille-douai.fr, Tel. +33 (0)3.27.71.21.87, or Prof. Patricia KRAWCZAK (Professor, POPCOM project leader), patricia.krawczak@imt-lille-douai.fr.

To apply, please send a detailed CV, a letter of motivation with explicit reference to the offer «**Post-Doc POPCOM 2020** » by e-mail to **Prof. Chung-Hae PARK** (chung-hae.park@imt-lille-douai.fr) and to the **Human Resources Department** (jobs@imt-lille-douai.fr).

Deadline date for submissions : 01/02/2020

Position Ref.: ELSAT2020_OS3P4_POPCOM_IMT_TPCIM_n°1

