

## *Master Internship offer 2018*

**Laboratory:** Department of Physics & Mechanics of Materials, Institut P', ISAE-ENSMA  
**Location:** ISAE-ENSMA, 1 Avenue Clément Ader, 86360 Chasseneuil-du-Poitou FRANCE  
**Supervisors:** Dr Olga Smerdova, Prof Marco Gigliotti  
**Funding:** Institute P' – ANR ImPEKKable program (a salary of around 500 Euros/month will be provided to the student)  
**Duration:** 6 months

### **Assessment of micromechanical properties of PEKK polymer by means of nanoindentation tests at high temperatures**

Polymer composites have been more and more used in aeronautical structures due to their light weight and good mechanical resistance. However, most of them are based on thermosetting resins, which are not recyclable. In this context, an important effort of research is made nowadays to develop new composites based on thermoplastic polymers that can withstand high loads, but also work at high temperatures as defined by the applications in aircraft engines.

This internship will focus on a study of a PEKK polymer destined to be used as a matrix of a carbon reinforced composite. This is a relatively new material and its mechanical behaviour in the oxidative environment under high temperatures has not been studied yet. This semi-crystalline polymer is meant to be used at temperatures above its glass transition, which may significantly affect its mechanical response. The nanoindentation technique, employed in this internship, enables a study of local mechanical properties at micro or nanoscale. The nanoindentation equipment will be coupled with a heating element to directly measure the polymer response at the operational temperatures. Moreover, the same technique will be employed to study local mechanical properties of PEKK polymer samples previously subjected to macroscopic mechanical loadings to verify possible changes of microstructure.

This internship is a part of ANR ImPEKKable research program – in collaboration with AIRBUS Group Innovation, ARKEMA, PIMM ENSAM Paris - and will run in parallel with a PhD thesis started at PPRIME Institute (ISAE-ENSMA) last year.

**Required skills:** fluent English or French (written and spoken), knowledge of mechanics of materials and polymers.

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