

## **NanoSteamEx (Intermediate Report)**

### **Production of microfibrillated cellulose by a steam explosion process**

*Nom, Prénom du porteur : BROSSE Nicolas*

*Unité d'appartenance : EA 4370 LERMAB*

*Partenaires : Labex TEC21 (Grenoble) MAURET Evelyne (LGP2, UMR5518)*

---

**Context** — Nano/Micro-Fibrillated Cellulose (M/NFC) have gained increasing attention for the production of new innovative materials due to their remarkable properties. The defibrillation of M/NFC generally requires intensive and energy consuming mechanical treatment which is preceded by chemical and/or enzymatic pretreatments. The high cost of these extraction processes constitutes one of the main limitation of the M/NFCs broad utilization.

**Objectives** — The objective of NanoSteamEx is to propose an innovative low-energy and environmentally friendly combinative process for the production of M/NFC from bleached chemical kraft fibres, softwood and hardwood and non woody plant. The main originality of the project is to combine a steam explosion pretreatment with an organosolv/ionic liquid delignification (with ethanol or 1-ethyl-3-methylimidazolium acetate) followed by refining / grinding steps. An important part of the work will be devoted to the development of reliable methods to characterise M/NFC in terms of morphological properties and chemical composition (hemicelluloses, lignin content, DP of cellulose). For this task, the available analytic tools of the Xylosciences platform (chromatographic and crystallographic methods) will be used.

**Expected results and impacts** — The final goals are (1) to reduce the energy consumption of the M/NFC production by reducing the energy necessary during the pre-treatment grinding steps (2) to tune the M/NFCs properties as a function of their chemical composition and their cellulose structure, (3) to isolate a pure lignin fraction from the organosolv process for further utilizations. Applications in the fields of packaging (films or nanopapers) and wood particleboard (tannins-based adhesives) will be considered in the project.