

Surface and Interface



Interfaces play a key role in many areas such as automotive sector, technical textiles. This is particularly the case in polymer composites whose performances are mainly driven by the interface and interphase integrity. In this area, the challenge is to develop new approaches to improve interfacial adhesion between symmetric and dissymmetric materials and on the opposite to promote disassembly to fit to recycling issues.

Additionally, any material requires additional functionality which can be imparted via surface treatment. In this area, the challenge is to develop new multi-functional nanostructured thin films ranging from passive coatings including hydrophilic/hydrophobic properties, fireproofing, gas and molecules barrier up to active coatings including stimuli responsive coatings i. e. selective membranes and self-healing properties.

At the Luxembourg Institute of Science and Technology (LIST), our research aims at developing innovative functional interfaces and surfaces. We tackle three main challenges:

- **Functionality:** How to optimize and/or add mechanical, thermal, electrical selective barrier functions and adapt of the system regarding market requirements and also manufacturing technologies.
- **Durability:** The solution envisaged must be robust and durable.
- **Sustainability:** Substitution of non-compliant REACH components, fully or partially bio-based polymers and (nano)composites, LCA, recycling (mechanical assembly/disassembly).

Our competencies

Our activities span from the molecules to the applications taking into consideration the behaviour over time from the lab scale to the pre-industrial scale relying on environmentally friendly dry and wet techniques. Our expertise covers:

- Hybrid systems that combine polymer and nanoparticles
- thin films of polymer network
- multi-layered films
- interfacial compatibilization
- characterization
- durability

Application areas

We work in close collaboration with various markets such as composites, plastic industries, manufacturing components (finishing step), biomedical and environmental domains.

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