

## ITI HiFunMat Master Internship Proposal

M 1

M 2

**Title: Synthesis and characterization of electrically conductive PEDOT coated particles for thermoplastic composite applications.**

### Internship supervisor

Name, first name	Parpaite, Thibault
E-mail, Telephone	<a href="mailto:parpaite.thibault@ics-cnrs.unistra.fr">parpaite.thibault@ics-cnrs.unistra.fr</a>
Laboratory	ICS
Collaboration with a HiFunMat member ( <i>please indicate their name</i> )	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes :

### Student profile looked for

Master program ( <i>more than one box can be ticked</i> )	<input checked="" type="checkbox"/> Material science and engineering <input checked="" type="checkbox"/> Chemistry <input type="checkbox"/> Physics
Other indications if necessary	

### Internship description

**Intrinsically conducting polymer materials (ICPs) are highly sought after for multiple emerging applications, particularly in the field of flexible electronics or plasronics due to their versatility and tunable electrical properties, which can be tailored for specific applications.**

**In the framework of the ANR ELABELEEC project (ELABoration of thermoplastic composites with high ELECtrical conductivity), the main objective of this M2 internship is to develop a portfolio of new core/shell like structures with various form factors from sphere to sheet (1D/2D/3D). To do so, mineral core such as silica or clays will be used as support for the polymerization of conductive polymers coating like poly(3,4-ethylenedioxythiophene) PEDOT.**

#### Internship work program will entail:

- State of the art of supported polymerization of PEDOT
- Synthesis of core/shell structures using eco-friendly polymerization of EDOT in water
- Numerous characterizations (morphologies, internal structure, electrical conductivity)
- Evaluating the homogeneity and thickness of the coating (SEM/TEM/cryo-TEM)
- Measure the electrical conductivity of synthesized structures using four probes system
- Characterize the internal structure of PEDOT (XRD)
- Processing of thermoplastics composites using twin screw extrusion (depending on progress)

The candidate must demonstrate good collaboration/teamwork (progress reporting) and communication skills (scientific data presentation oral and written in English) throughout the duration of the internship

The candidate will be able develop valuable skills in bibliographic search, structure/properties relationship of conductive polymer, oxidative polymerization process, synthesis and characterization of core/shell objects. The candidate will be integrated in the IP2 team of ICS and will be supervised by a multidisciplinary team.

A funding for a thesis on the same project has been approved with an aim to start the work in September 2024. Depending on the progress of the work, the candidature for the thesis could be secured after internship.