

Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website www-csc.utt.fr)

Supervisor's name : Lamnawar Given names : khalid

Status (prof., assistant prof., ...) : Full Professor

Laboratory : IMP-UMR CNRS 5223 Website address : <https://imp-umr5223.cnrs.fr/>

Institution : INSA LYON Website address : <https://www.insa-lyon.fr/>

Scientific competence of the supervisor:

Rheology, Polymer Processing, Multilayers, recycling, Biopolymers, Composites. Supervisor: Khalid Lamnawar (INSA-Lyon); Co-supervisor: Huagui Zhang (Fujian Normal University)

Two major publications in the field proposed for the PhD :

1. J. Li, E. Masghouni, G. Sudre, B. Lu, A. Maazouz, J. Maia, K. Lamnawar*, Understanding Distribution and Alignment of MWCNTs inside Multilayer Polymer Systems via the Experimental Study of Anisotropic and
2. Qiao H., Zheng B., Zhong G., Li, Z., Cardinaels R., Moldenaers P., Lamnawar K., Maazouz A., Liu C., Zhang H. (2023). Understanding the rheology of polymer-polymer interfaces covered with Janus nanoparticles:

Website address of the personal page :

Supervisor's email : khalid.lamnawar@insa-lyon.fr, huagui.zhang@fjnu.edu.cn;

Description of the research work proposed for a PhD

Topic # (see list) :

Title : Functional Multilayer films with Janus Particles: Enhanced dispersion, interfacial chain dynamics and dielectric performance

Subject :

The poor control of nanoparticle dispersion and interfacial chain dynamics hinders the functional dielectric properties of polymer composites. Janus nanoparticles is a kind of anisotropic particles with distinct chemical functionalities on opposite sides which can offer a powerful platform to overcome these limitations by enabling simultaneous compatibilization, controlled localization at interfaces and tailored polarization responses. When endowed with special structural design, these Janus particles can dramatically enhance dielectric performance while maintaining processability in multilayer architectures. This unique design allows precise tuning of particle orientation, dispersion and interfacial interactions within polymer matrices, directly influencing chain relaxation phenomena at the polymer-particle interface.

The project proposes the synthesis of specific Janus nanoparticles and their integration into advanced multilayer polymer films using recycled polymers to fabricate composite materials and realize upcycling. The project will focus on generating well-dispersed, interface-optimized architectures without external compatibilizers. Fundamental studies will focus on the dispersion and dynamics of the Janus particles using advanced dielectric spectroscopy and rheological techniques, with particular emphasis on interfacial chain relaxation mechanisms.

Keywords :

Multilayer film, rheology, interfacial phenomenon, Janus particles, upcycling

Expected collaborations :

The project builds on the established collaboration between INSA Lyon (France) and Fujian Normal university, combining expertise in nanoparticle synthesis, innovative processing, rheology, dielectric physics via co-supervision of one PhD student.

Background required from the applicant :

Prospective candidates should hold a Master's degree in Polymer Processing, Materials Science, Chemical Engineering, Chemistry, or a related discipline, with a strong academic record and hands-on laboratory experience. We are looking for highly motivated individuals with a solid foundation in material characterization and processing; notably, a background in polymer rheology is considered a significant advantage. The ideal applicants must demonstrate excellent problem-solving skills, the ability to conduct independent research, and strong English

Existence of a PDF file detailing the proposal ("yes" or "no") :

(see guidelines on the website www-csc.utt.fr)