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 : DELBECQ Given names : Frederic

Status (prof., assistant prof., …) : Associate professor (Enseignant Chercheur HDR)

Laboratory : TIMR (UTC-Escom) Website address : https://timr.utc.fr

Institution : Université de Technologie de Compiègne Website address : https;//utc.fr

Scientific competence of the supervisor:

Dr Frederic Delbecq Is currently working as associate professor in TIMR (Escom-UTC) where he gives lectures on polymer chemistry and materials. Before, for ten years he worked as researcher in various research institutes and Universities in Japan, where he is was able to improve his knowledge and skills in the field of organic, physical and supramolecular chemistry. He his currently supervising the work of two PhD candidates in the field of polymer composite materials dedicated to biological applications.

Two major publications in the field proposed for the PhD :

1. Biobased polyesteramide derived from bis furanic diamine and aliphatic diesters of varied chain lengths, International Journal of Polymer Analysis and Characterization, 2024, 29, 316-327.
2. Biobased Semi-Crystalline Polyesteramide from 2,5-furan dicarboxylic Acid and 5,5'-(Isopropylidene) bis (2-Furfurylamine), ACS Sustainable Chemistry & Engineering, 2023, 11, 10344-10351.

Website address of the personal page :

Supervisor's email : f.delbecq@escom.fr

Description of the research work proposed for a PhD ***Topic # (see list) :*** IV-10

Title : Design and synthesis of new biobased polyesteramides from furanic compounds for the prodcution of composite materials

Subject :

This subject focuses on the development of new biobased polymers such as polyesteramides or isocyanate-free polyurethanes partially made from furan-based monomers. Recently, furfural derivatives such as furoic acid esters and furfurylamines are employed as building-blocks to produce various kind of monomers such as diacids, diesters or diamines. Besides, these monomers are sufficienly stable and suitable to react with other biobased fatty aliphatic monomers in the presence of a typical organometallic or organic catalyst to afford the target polymers. As substitutes of oil-based monomers, these polymers were produced through simple neat reactions. Later, we intend to produce polymers using alternative techniques such as mechano-chemistry (ball-milling). In the second stage of this project, we would like to use our above produced polymers as components of composite materials made of a selected polymer employed to become the matrix, obviously a biodegradable polyester, essentially by using active extrusion process without solvent. For each polymer, biodegrability and biocompatibility tests should be carried out.

Keywords :

Organic synthesis, polymer science, physico chemistry, green chemistry, alternative techniques.

Expected collaborations :

Pr Philippe Guegan Institut Parisen de Chimie Moleculaire (IPCM) Sorbonne University, Paris : Some further analysis such as mechanical resistance tests, size exclusion chromatography (molecular mass evaluation) could be carried on place. Pr C. Egles and his collaborators from Université of Rouen (Equipe BioMMAT) could evaluate the biocompatibility of the composite materials once achieved.

Background required from the applicant :

Good knowledge and sufficient skill in the field of organic chemistry, some experience of polymer synthesis, we are looking for a candidate open to other sciences (biology, physic, etc)

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

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