

Ph.D. Position in Polymer Science

Subject: Rheological and Thermodynamic Study of Polyethylene Blends with the Aim of Improving their Circularity

Context :

LIPEC-PolymerÉTS the composites and polymers engineering laboratory of Ecole de Technologie Supérieure de Montréal is looking for a candidate for a doctoral researcher position in the field of polymer blends. This thesis work will be carried out as part of a collaboration involving the multinational NOVA Chemicals, Calgary, the leading producer of polyethylene in Canada, and École de Technologie Supérieure de Montréal (Department of Mechanical Engineering), Canada. Half of the research will be carried out at the company site and the other half at the University.

Research Objectives:

As part of a circular economy, it is essential to recycle plastic waste. Often, recycled polymers, once sorted and decontaminated, are mixed with polymers of the same chemical nature, aiming at generating blends of miscible polymers, with adequate properties. However, in the case of polyethylene, which contributes to more than 30% of plastic waste, the use of polymer blends to reclaim the properties of the recycled material is far from an easy task. Indeed, recycled polyethylene contains different grades (high-density, linear low-density, and low-density polyethylene among others) that are difficult to separate and are not miscible with one another. The understanding and control of the properties of blends of polyethylene of different types are therefore essential if one wants to reclaim recycled polyethylene. For that, theoretical and experimental studies on the rheology of polyethylene blends to access their miscibility as well as on the crystallization of their blends should be carried out. Unfortunately, the existing results from the literature on the subject are still very contradictory. This project aims therefore at carrying out a fundamental study of the rheological behavior of polyethylene blends as well as of their crystallization under different processing conditions as a tool for controlling their morphology. In the second step of the study, a relationship between the morphologies obtained and the mechanical properties of the blends will be established. The obtained results will then be used as a tool to formulate blends based on recycled polyethylene. This thesis will be co-funded by Nova Chemicals and Canadian granting agencies.

Required qualifications:

Master in chemical engineering of materials engineering with a good background in polymers.
Full proficiency in English

Conditions:

Compensation :	Scholarship to be discussed
Starting date :	September 2023
Laboratory :	LIPEC – PolymerÉTS : https://polymerets.etsmtl.ca/
Thesis supervisor	Pr. N.R. Demarquette

How to apply :

Interested applicants should send a C.V., contact information of two referees, transcripts, and a cover letter outlining their research experience to Pr Nicole R. Demarquette nicoler.demarquette@etsmtl.ca