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Electrocatalysed synthesis of bio-based polymers in a continuous flow reactor

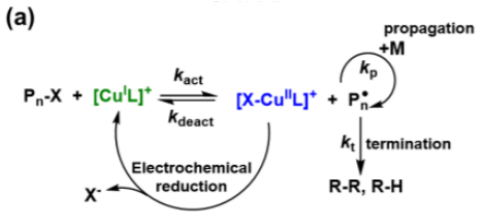
for a sustainable chemistry (*ePolymFlow*)

This PhD thesis is proposed as a joint project between two research institutes in Normandy Region: PBS Laboratory (UMR 6266, INSA Rouen Normandie, Dr. Daniela VULUGA, Lecturer) and Institut CARMeN (UMR CNRS 6064, Université de Rouen Normandie, Dr. Laëtitia CHAUSSET-BOISSARIE Research Scientist) with the aim of developing new polymer synthesis processes in micro/millifluidic reactors under electrochemical activation using biosourced acrylates for circular chemistry. In this study, we will be looking at poly-methylmethacrylate (PMMA) for its controlled polymerisation using more eco-friendly methods, as well as its controlled copolymerisation with a compound that will induce two different degradation modes favoring the recyclability of the material obtained.

The main idea of the ePolymFlow project is based on the production of polymers by ferroelectro-catalysed atom transfer radical polymerisation in a gentle and controlled manner from acrylate monomers derived from biomass in a conventional cell and in continuous flow. By combining electrochemical activation (sustainable conditions) and flow chemistry (residence time control, improved faradic yield), we plan to effectively control the formation of biobased polymers by introducing a redox-active comonomer to give them different recycling options.

The methodological study we are planning will therefore be divided into three work packages (WP):

1. Ferroelectro-catalysed radical atom transfer polymerisation of methyl methacrylate
2. Continuous flow transposition
3. Introduction of a single co-monomer for two possible types of degradation



The applicant will work on organic synthesis and polymer chemistry in electrochemical and continuous flow reactors. At all stages, the compounds obtained will be characterised using conventional methods for organic and macromolecular materials: NMR, GPC, IR, UV, MS, TGA, DSC. For these reasons, the candidate must have a master's degree in organic or polymer chemistry.

A good level of English or French is required.

Documents to be provided: CV (1 page); Transcript of academic records from last year; References from internship supervisors.

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