

UNIVERSITY: Lille , Faculty of Sciences and Technologies

Scientific field : Chemistry

Title of the thesis: New developments in chain shuttling polymerization

Supervisor(s): Nicolas Merle, Philippe Zinck

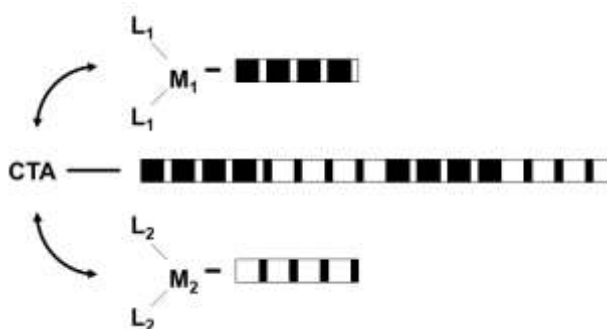
Laboratory: Unity of Catalysis and Solid State Chemistry, UCCS, UMR 8181

Related research project (international/national/regional):

Expected/obtained funding: University of Lille

ABSTRACT

Block copolymers are widely used in different fields such as biomedicine, adhesion, energy or microelectronics. Chain shuttling polymerization (CSP),[1] whose principle is depicted Scheme 1, allows to synthesize in a one step one pot procedure, via a shuttle between two catalysts presenting different reactivity, original multiblock microstructures. Our group possesses a recognized know-how in this field.[2]-[3]



Scheme 1. CSP with two catalysts affording the statistical copolymerization of the comonomers 1 (“black”) and 2 (“white”) – M is a metal, L and ligand and CTA is a chain transfer or chain shuttling agent

The objective of this PhD is to develop new catalytic systems for chain shuttling polymerization reactions. This will allow the successful candidate to develop skills in organometallic chemistry, polymerization catalysis and polymer characterization.

[1] D.J. Arriola, *Catalytic Production of Olefin Block Copolymers via Chain Shuttling Polymerization*, *Science*. 312 (2006) 714–719. <https://doi.org/10.1126/science.1125268>.

[2] A. Valente, G. Stoclet, F. Bonnet, A. Mortreux, M. Visseaux, P. Zinck, *Isoprene-Styrene Chain Shuttling Copolymerization Mediated by a Lanthanide Half-Sandwich Complex and a Lanthanidocene: Straightforward Access to a New Type of Thermoplastic Elastomers*, *Angew. Chem. Int. Ed.* 53 (2014) 4638–4641. <https://doi.org/10.1002/anie.201311057>.

[3] Y. Phuphuak, F. Bonnet, G. Stoclet, M. Bria, P. Zinck, *Isoprene chain shuttling polymerisation between cis and trans regulating catalysts: straightforward access to a new material*, *Chem Commun.* 53 (2017) 5330–5333. <https://doi.org/10.1039/C7CC01016H>.

Planned recruitment date : October 2020

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