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Telechelic Polymers via Ring Opening Metathesis Polymerisation (ROMP)

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Ring opening metathesis polymerisation (ROMP), in which the cyclic olefin undergoes ring opening to form a linear polymer chain, has been used widely in the fields of organic chemistry, macromolecular chemistry, medicinal chemistry and material chemistry. However, there are limited methods to end-functionalize ring opening metathesis polymers. Therefore, two new end-functionalization methods and one catalytic living ring opening metathesis polymerisation method were developed in this thesis.

After a general knowledge and background of ROMP, telechelic polymers and telechelic polymers via ROMP introduction, an enolesters as chain end-functionalizing agents for living ROMP method was developed. Compared with other terminating agents, enolester terminating agents have better functional group compatibility, accessibility and are easier to introduce functional groups to the end of polymer chains while keeping the same regio-selectivity and polydispersity as observed for vinyl ethers.

Following up, heterotelechelic polymers were synthesized by a kinetic telechelic ring opening metathesis polymerisation method relying on the regio selective cross-metathesis of the propagating Grubbs' first-generation catalyst with cinnamyl alcohol derivatives. This procedure allowed for the synthesis of hetero-*bis*-end-functional polymers in a one-pot setup with commercially available cinnamyl alcohol derivatives and catalytic amount of catalyst.

In addition, a very interesting and useful catalytic living ROMP method was described. Different from the traditional living ROMP that one catalyst molecule can only generate one polymer chain, one catalyst molecule can generate up to 100 polymer chains in newly developed catalytic living ROMP method. This can reduce the catalyst loading amount sharply, which is economically and environmentaly friendly.

At last, an outlook presented the possible future directions and application potential of telechelic polymers via ring opening metathesis polymerisation especially in a catalytic living way.

Jury:

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