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Catalytic Living Ring-Opening Metathesis Polymerization (ROMP)

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Ring-opening metathesis polymerization (ROMP), as an efficient and reliable technique for synthesizing linear polymers, has been widely used in material science, academic research and industrial applications. In traditional ROMP, even though using the corresponding methods (i.e., pool solvent precipitate and wash, dialysis) to reduce the content of the metal complex, the polymers still contain high transition metal loadings, which are considered not environmental and economically friendly, and may limit their application in biomedical, materials, academic and industrial applications.

This thesis is focused on developing methods to make polymers via catalytic living ring-opening metathesis polymerization (ROMP). For this purpose, many new chain transfer agents (CTAs) and monomers are developed and applied to ROMP in this thesis. Several new CTAs and new monomers were successfully designed and synthesized in reasonable protocols with normal chemicals. Unfortunately, even though the CTAs did not get the ideal results in catalytic living ROMP, they at least showed their potential, especially the CTA containing O-heterocyclic rings. A new slow monomer (oxanorbornene) was developed to coordinate the CTAs in ROMP. This monomer's unique characteristics (slow propagation rate while high ring strain) make it hard to control the molecular weight and dispersity in catalytic living ROMP with obtained CTAs.

Jury:
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