

Cobalt complexes as versatile tool for the controlled synthesis of polyesters and the upcycling of plastic wastes

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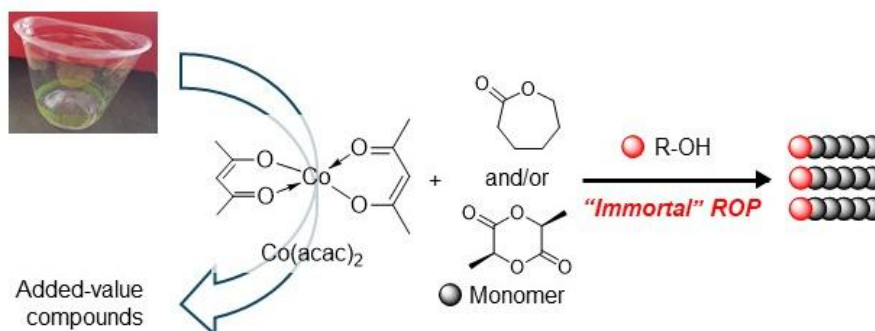
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Résumé :

The development of sustainable polymerization and recycling processes is a major challenge for polymer science.[1],[2] Despite its rare use in ring-opening polymerization (ROP), cobalt offers significant advantages as a ROP catalyst,[3] including robustness, air and moisture tolerance, enhanced Lewis acidity, and compatibility with bulk and immortal polymerization protocols, leading to high activity and control.

We report here that the simple and commercially available cobalt(II) acetylacetonate complex, $\text{Co}(\text{acac})_2$, exemplifies this potential and constitutes a versatile and robust catalyst for both the controlled synthesis and the chemical recycling of polyesters. Indeed, $\text{Co}(\text{acac})_2$ enabled the well-controlled ROP of lactide and ϵ -caprolactone under solvent-free conditions. Good control over molar masses and dispersities was achieved, including under “immortal” conditions, highlighting the efficiency and practical interest of this catalyst.[4]



Controlled (co)polymerization of lactones and selective plastic upcycling with $\text{Co}(\text{acac})_2$

Beyond polymer synthesis, $\text{Co}(\text{acac})_2$ promoted selective depolymerization, allowing the upcycling of post-consumer plastic wastes. Efficient chemical recycling of polylactide (PLA) and polyethylene terephthalate (PET) was achieved under different reaction conditions, enabling their selective depolymerization and opening new perspectives for circular polyester chemistry.[4][5]

This dual activity demonstrates that simple cobalt complexes are powerful tools for sustainable polymer synthesis and recycling.

Références :

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