

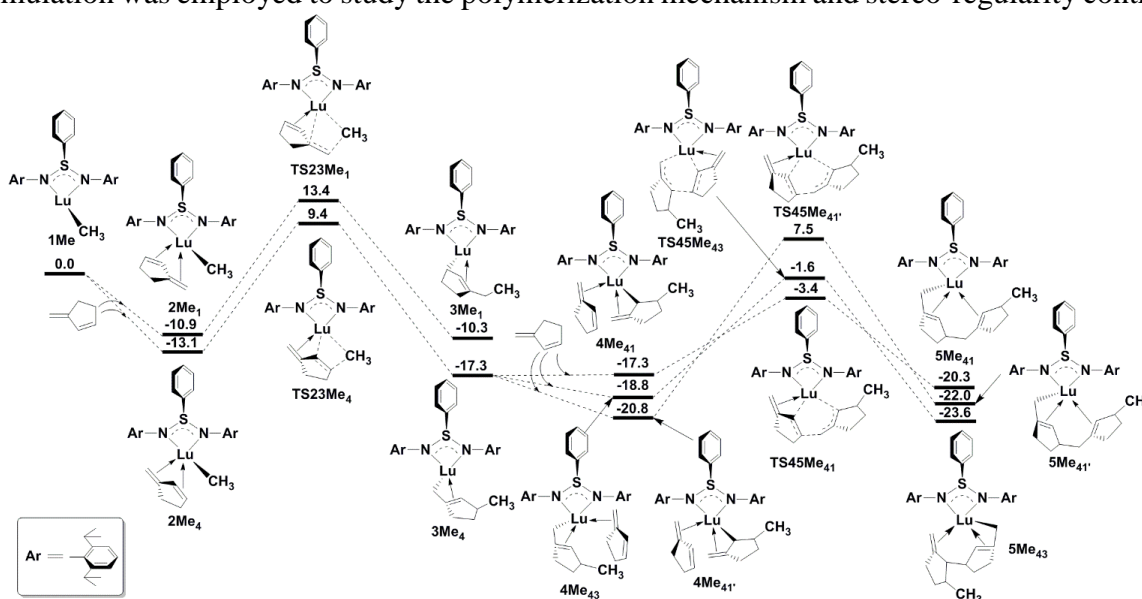
Coordination Polymerization of Renewable 3-Methylenecyclopentene with Rare-Earth Metal Precursors

Bo Liu, Shihui Li, Dongmei Cui*

State Key Laboratory of Polymer Physics and Chemistry, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun 130022, China

E-mail: dmcui@ciac.ac.cn

Coordination polymerization of the renewable 3-methylenecyclopentene has been investigated for the first time by using rare-earth metal-based precursors bearing various bulky ligands. All these complexes can catalyze the controllable polymerization of 3-methylenecyclopentene to give high molecular weight polymers, of which the NPN- and NSN-tridentate *non*-Cp ligated lutetium complexes based catalyst systems exhibited extremely high activities up to 11520 kg/(mol_{Lu}•h) in a dilute toluene solution (3.2 g/100 mL) at room temperature. The resultant polymers have pure 1,4-regioregularity (>99%) and designable number average molecular weights (1–20×10⁴) with narrow molecular weight distributions (PDI = 1.45–1.79). DFT simulation was employed to study the polymerization mechanism and stereo-regularity control



References

1. Y. Zhu, C. Romain, C. K. Williams, *Nature*, **2016**, 540, 354.
2. A. Llevot, M. A. R. Meier, *Green Chem.*, **2016**, 18, 4800.
3. A. Gandini, T. M. Lacerda, *Progr. Polym. Sci.*, **2015**, 48, 1.
4. K. Yao, C. Tang, *Macromolecules*, **2013**, 46, 1689.
5. P. A. Wilbon, F. Chu, C. Tang, *Macromol. Rapid Commun.* **2013**, 34, 8.
6. G. Q. Chen, M. K. Patel, *Chem. Rev.*, **2012**, 112, 2082.