

Curriculum vitae

Pibo Liu

PERSONAL BRIEF

Name: Pibo Liu
Gender: Male
Birth Date: July 22th, 1990
Nationality: China
Institution: Sated Key Laboratory of Fine Chemicals School of Chemical Engineering
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OBJECTIVE

Postdoctoral researcher in Prof. Nikos Hadjichristidis' Lab

EDUCATION

- 2013~Now **M. C. E.** and **Ph.D.** Polymer Materials, Dalian University of Technology.
- 2009~2013 **B.E** Polymer Materials, Shenyang University of Chemical Technology.

Honors

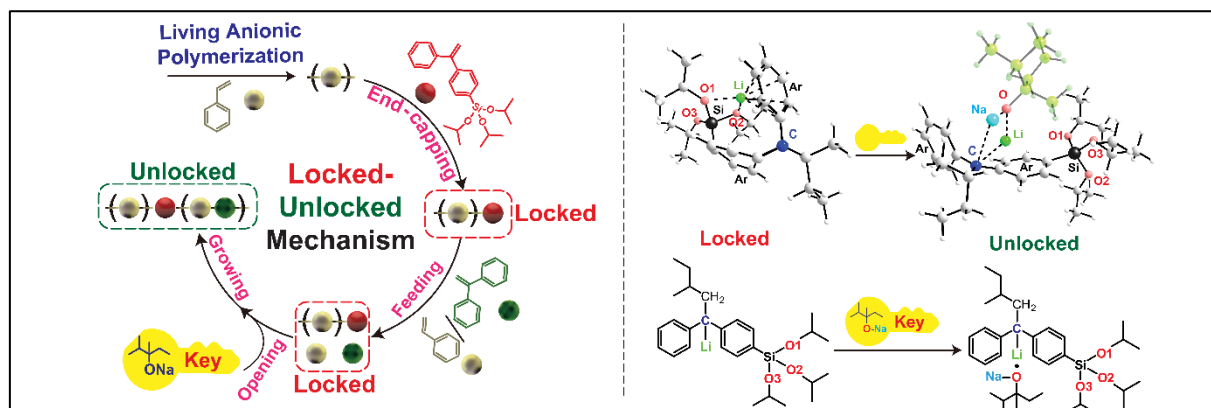
2017 National Scholarship, Dalian University of Technology.
2015 The second Rank Award Scholarship, Dalian University of Technology.
2013 Outstanding Graduates, Shenyang University of Chemical Technology.
2010 Merit Student Award, Shenyang University of Chemical Technology.
2009 The First Rank Award Scholarship, Shenyang University of Chemical Technology.

EXPERIMENTAL SKILLS

- ✧ Experienced in organic compounds synthetic and purification techniques
- ✧ Experienced in polymeric synthetic techniques (anionic polymerization or click chemistry)
- ✧ Experienced in Gaussian simulation on the reactive center and monomers
- ✧ Familiar with NMR, FTIR, EI-MS, MALDI-TOF, GPC, RPA, DMA, DSC, SEM, TEM, SAXS.
- ✧ Familiar with common software: Microsoft Offices, Chemoffice, and Origin, Adobe Illustrator, Gaussian 09, GaussianView

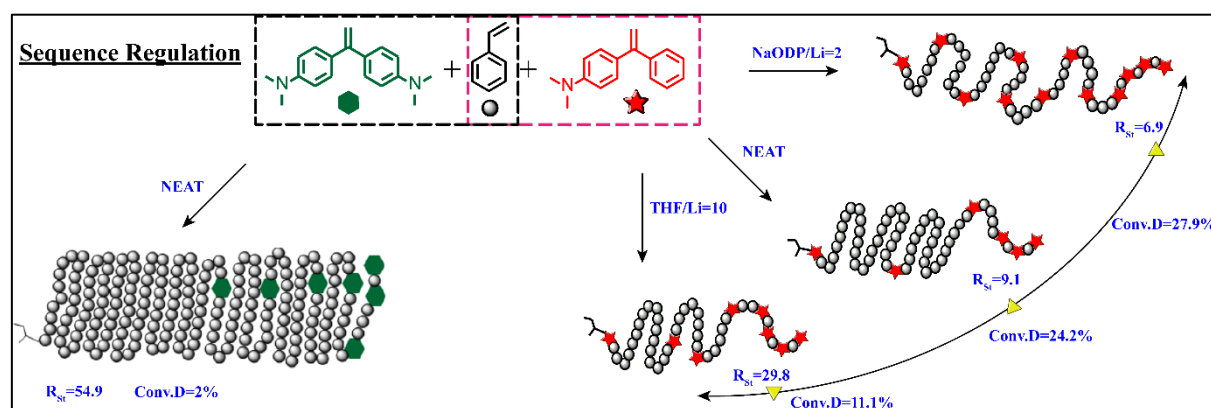
RESEARCH EXPERIENCES

Investigation of the “Locked-Unlocked” Mechanism in Living Anionic Polymerization



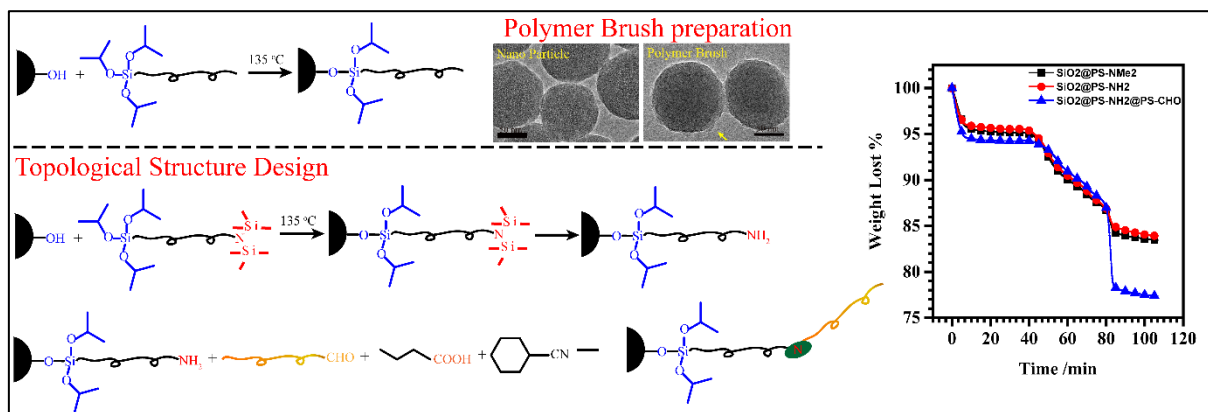
This work deals with the “Locked-Unlocked” mechanism via DPE-Si(OiPr)₃ and NaODP (additive) where the living anionic species could be quantitatively locked by end-capping of DPE-Si(OiPr)₃ and be unlocked by adding the “Key”-NaODP including (1) the verification of the mechanism by designing sequential feeding of quantitative DPE-Si(OiPr)₃ and traditional monomers mixed with NaODP and subsequently characterizing the corresponding samples taken during the feeding process with GPC, NMR, and MALDI-TOF-MS. (2) the confirmation of the “Locked-Unlocked” reasonable mechanism in LAP was simulated by the Gaussian method based on the significant difference between the normal ¹³C and 135° DEPT-¹³C NMR spectra of the locked and unlocked living species.

Determination/regulation of amine groups’ sequence distribution along the polymer chains



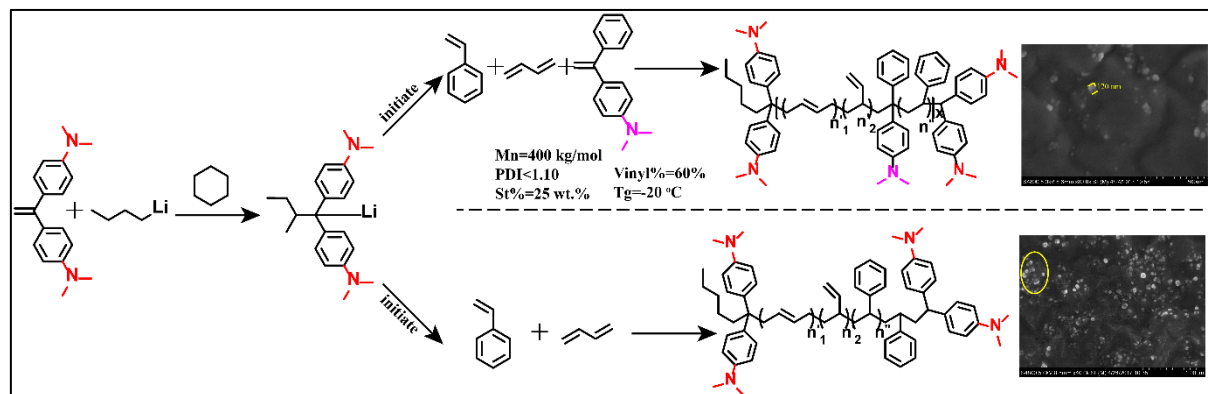
This work deals with the sequence determination and then regulation of the copolymerization between styrene and amine functionalized DPE derivatives in living anionic polymerization, including (1) the sequence determination in the copolymerization of styrene and 1-(4-dimethylaminophenyl)-1-phenylethylene (DPE-NMe₂) or 1,1-bis(4-N,N-dimethylaminophenyl)ethylene (DPE-(NMe₂)₂), (2) the sequence regulation in the living anionic copolymerization of styrene and DPE-NMe₂ by modification with different additives.

✧ Design and preparation of topological polymer brushes



This work starts with the synthesis of several novel DPE derivatives possessing alkoxy silyl groups ($-\text{Si}(\text{O}-i\text{Pr})_3$ or $-\text{SiOEt}$ or $-\text{Si}(\text{OEt})_3$) that can covalently connect onto silica surface and protected amino groups (DPE-UGI) that can be used within Ugi four-component reaction, based on which the polymer brushes architectures were designed via 4-UGI, including (1) the synthesis of precise α - and ω - end-functionalized polystyrene that confirmed by ^1H NMR, GPC and MALDI-TOF, (2) the de-protection of the N-(trimethylsilyl) on the surface of NPs, and (3) the preparation of polymer brush architecture by 4-UGI reaction.

✧ Preparation of *in*- or *end*-chain amine functionalized styrene-butadiene rubber



This work deals with a strategy for preparing the *in*- or *end*-chain amine functionalized SBRs for high-performance tires and regulating their composition and microstructure, including (1) preparation of the amine functionalized monomer through Wittig reaction, and their purification by recrystallization and column chromatography and (2) the preparation of the *in*- or *end*- chain functionalized SBRs via anionic polymerization and the characterization of the SBR/silica vulcanizate.

PUBLICATIONS

Journal Papers

1. **Liu, P.**; Ma, H.*; Han, L.; Shen, H.; Yang, L.; Li, C.; Hao, X.; Li, Y., Investigation of the "Locked-Unlocked" Mechanism in Living Anionic Polymerization Realized with 1-(Tri-isopropoxymethylsilylphenyl)-1-phenylethylene (DPE-Si(O-iPr)₃). *Angewandte Chemie* 2018. (Accepted as Very Important Paper)
2. **Liu, P.**; Ma, H.; Han, L.; Yang, L.; Shen, H.; Li, C.; Li, Y., The effect of amine-functionalized 1,1-diphenylethylene (DPE) derivatives on end-capping reactions and the simulation of their precision for sequence control. *Polymer* 2018, 147, 157.
3. **Liu, P.**; Ma, H.; Shen, H.; Han, L.; Chang, S.; Zang, L.; Bian, Y.; Bai, Y.; Li, Y., Study on the Mechanism of a Side Coupling Reaction during the Living Anionic Copolymerization of Styrene and 1-(Ethoxydimethylsilylphenyl)-1-phenylethylene (DPE-SiOEt). *Polymers* 2017, 9 (5).
4. **Liu, P.**; Ma, H.; Huang, W.; Han, L.; Hao, X.; Shen, H.; Bai, Y.; Li, Y., Sequence regulation in the living anionic copolymerization of styrene and 1-(4-dimethylaminophenyl)-1-phenylethylene by modification with different additives. *Polym. Chem.* 2017, 8 (11), 1778.
5. **Liu, P.**; Ma, H.; Huang, W.; Shen, H.; Wu, L.; Li, Y.; Wang, Y., The determination of sequence distribution in the living anionic copolymerization of styrene and strong electron-donating DPE derivative-1,1-bis(4-N,N-dimethylanimophenyl)ethylene. *Polymer* 2016, 97, 167.
6. Huang, W.; Ma, H.; Han, L.; **Liu, P.**; Yang, L.; Shen H.; Hao, X.; Li, Y., Synchronous Regulation of Periodicity and Monomer Sequence during Living Anionic Copolymerization of Styrene and Dimethyl-[4-(1-phenylvinyl)phenyl]silane (DPE-SiH). *Macromolecules* 2018 51 (10), 3746
7. Yang, L.; Ma, H.; Han, L.; Hao, X.; **Liu, P.**; Shen, H.; Li, Y., Synthesis of a sequence-controlled in-chain alkynyl/tertiary amino dual-functionalized terpolymer via living anionic polymerization. *Polym. Chem.* 2018, 9 (1), 108.
8. Shen, H.; Ma, H.; **Liu, P.**; Huang, W.; Han, L.; Li, C.; Li, Y., Facile Synthesis of In-Chain, Multicomponent, Functionalized Polymers via Living Anionic Copolymerization through the Ugi Four-Component Reaction (Ugi-4CR). *Macromol. Rapid Commun.* 2017, 38 (18).
9. Han, L.; Ma, H.; Zhu, S.; **Liu, P.**; Shen, H.; Yang, L.; Tan, R.; Huang, W.; Li, Y., Effect of Topology and Composition on Liquid Crystal Order and Self-Assembly Performances Driven by Asynchronously Controlled Grafting Density. *Macromolecules* 2017, 50 (21), 8334-8345.
10. Wang, Q.; Ma, H.; Sang, W.; Han, L.; **Liu, P.**; Shen, H.; Huang, W.; Gong, X.; Yang, L.; Wang, Y.; Li, Y., Synthesis of sequence-determined bottlebrush polymers based on sequence determination in living anionic copolymerization of styrene and dimethyl(4-(1-phenylvinyl)phenyl) silane. *Polym. Chem.* 2016, 7 (18), 3090-3099.
11. Ma, H.; Wang, Q.; Sang, W.; Han, L.; **Liu, P.**; Sheng, H.; Wang, Y.; Li, Y., Facile Synthesis of DendriMac Polymers via the Combination of Living Anionic Polymerization and Highly Efficient Coupling Reactions. *Macromol. Rapid Commun.* 2016, 37 (2), 168-173.

12. Han, L.; Ma, H.; Li, Y.; Zhu, S.; Yang, L.; Tan, R.; **Liu, P.**; Shen, H.; Huang, W.; Gong, X., Strategies for Tailoring LC-Functionalized Polymer: Probe Contribution of Si-O-Si versus Si-C Spacer to Thermal and Polarized Optical Performance "Driven by" Well-Designed Grafting Density and Precision in Flexible/Rigid Matrix. *Macromolecules* 2016, 49 (15), 5350-5365.
13. Ma, H.; Wang, Q.; Sang, W.; Han, L.; **Liu, P.**; Chen, J.; Li, Y.; Wang, Y., Synthesis of Bottlebrush Polystyrenes with Uniform, Alternating, and Gradient Distributions of Brushes Via Living Anionic Polymerization and Hydrosilylation. *Macromol. Rapid Commun.* 2015, 36 (8), 726-732.

Conference Proceedings

1. **Pibo Liu**, Wei Huang, Hongwei Ma, The sequence distribution of DPE-(NMe₂)₂ and dimethylamino in-chain multi-functionalized polystyrene, Symp. Of Chinese Chemistry Society, 2016
2. Hongwei Ma, Wei Sang, Qiuyun Wang, **Pibo Liu**, The sequence regulation via anionic polymerization, Polymer Symp. Of China, 2015.

Patents Applications

1. CN 105837751 The preparation of in/end-chain alkoxyethyl functionalized styrene-butadiene rubber (SBR) via anionic polymerization. *Chinese National Invention Patent*, issued 2018.
2. 201810886408.1 The preparation of in/end-chain alkoxyethyl/amine functionalized styrene-butadiene rubber(SBR) via anionic polymerization. *Chinese National Invention Patent*, Under a legal checkup. 2018.