

Bingrui Li

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Work Address

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Education	Case Western Reserve University, Cleveland, Ohio, USA	2014-2016
	M.S. Macromolecular Science Advisor: Prof. LaShanda Korley	
	Jilin University, Changchun, Jilin, China	2008-2012
	B.Eng. Polymer Materials and Engineering	

Professional Skills

Synthetic skill: independently conducting multi-step synthesis from mg to g scale. Chromatography, crystallization, purification, water/air-free reactions, Mitsunobu reaction, Gabriel reaction, peptide chemistry, proton exchange reaction, end-group functionalization, thiol-ene reaction.

Polymer synthesis: Free-radical polymerization, condensation polymerization, RAFT polymerization, ring-opening polymerization, polymer functionalization.

Characterization techniques: NMR, MALDI-TOF, UV-Vis, GPC, ATR, DSC, DMA, TGA, SEM, AFM, SAXS/WAXS, Rheometer, Tensile testing.

Professional Experience

Post-Master Research Associate (Sokolov Group, Chemical Sciences Division, Oak Ridge National Laboratory) 2016-present

- *Novel Polymeric Membrane for Gas Separation*
Utilize synthetic strategy to optimize CO₂ separation performance of polymer membranes with enhanced mechanical/self-healing properties. Conduct gas permeation, mechanical and thermal characterizations.
- *High Performance Polymer Binder for Si-Anode*
Synthesize multi-grafted polymers as binders of Si anode, assemble cells and perform cycling tests of the Li-ion batteries.
- *Polymerized Ionic Liquids(PILs)*
Synthesis, functionalization and characterization of polyimidazole based PILs.
Elastic Solid Polyelectrolytes: Fabricate elastic poly(ionic liquid)s by RAFT polymerization and urea chemistry, perform characterizations(thermal, mechanical, dielectric and rheology) of the membrane.
- *Polymeric Vacuum Insulation Panels(PVIP)/Spheres(PVIS)*
Develop the concept of self-healable PVIP and PVIS, fabrication of demo units and SEM analysis.

Master Student (Korley Group, Case Western Reserve University) 2014-2016

- *Bio-inspired Peptidic Polyurea Hydrogel*
Synthesis and characterization of α,ω -Diamino poly(ethylene glycol).
Fabricate PEG-peptide hydrogel by utilizing covalent cross-linking(urea-chemistry).
Investigate peptide ordering's effect on bulk properties.
Gel analysis by utilizing ATR, DSC, AFM, SAXS/WAXS and tensile testing.
- *Electrospun Poly(vinyl alcohol) Nanofiber*
Optimize electro-spinning conditions and conduct SEM analysis.

- Optimization of hypericin's synthetic route, conduct column chromatography purification and NMR, DSC characterization.
- Grafting polymerization on luffa sponge to gain materials with good metal ions adsorption in aqueous environment.
- Grafting polymerization of N-isopropylacrylamide on macroporous polyvinyl alcohol formaldehyde sponges and study on their temperature responsive behavior.

Undergraduate Research Assistant (Changchun Institute of Applied Chemistry, Chinese Academy of Sciences)

2012

- Synthesis and characterization (NMR, FT-IR, DSC, GPC) of poly(ethylene glycol)-poly(L-lactide)-poly(ethylene glycol) (PEG-PLLA-PEG).

Publications

"Adsorption Behavior of Hydrophilic Luffa Sponges to Heavy Metal Ions in Water System", Zhi Liu, **Bingrui Li**, Yanxiong Pan, Kai Shi, Weicai Wang, Chao Peng, Zhe Wang, Xiangling Ji. *Chemical Journal of Chinese Universities*, **2017**, 38, 4, 669-677

"Robust and Elastic Polymer Membrane with Tunable Properties for Gas Separation", Peng-Fei Cao†, **Bingrui Li**†, Tao Hong, Kunyue Xing, Dmitry N. Voylov, Shiwang Cheng, Alexander Kisluk, Shannon M. Mahurin, Alexei P. Sokolov, Tomonori Saito. *ACS Appl. Mater. Interfaces*, **2017**, 9, 26483–26491

"A star-shaped single lithium-ion conducting block copolymer by grafting a POSS nanoparticle", Peng-Fei Cao, Zenata Wojnarowska, Tao Hong, Bobby Carroll, **Bingrui Li**, Leo Parsons, Panchao Yin, Shiwang Cheng, Vera Bocharova, Alexei Sokolov, Tomonori Saito. *Polymer*, **2017**, 124, 117-127

"The Influence of Chain Rigidity and Dielectric Constant on the Glass Transition Temperature in Polymerized Ionic Liquids", Vera Bocharova, Zaneta Wojnarowska, Peng-Fei Cao, Yao Fu, Rajeev Kumar, **Bingrui Li**, Vladimir N Novikov, Sheng Zhao, Alexander M Kisluk, Tomonori Saito, Jimmy W. Mays, Bobby G. Sumpter, and Alexei P. Sokolov. *J. Phys. Chem. B*, **2017**, 121, 51, 11511–11519

"Effect of Binder Architecture on the Performance of Silicon/Graphite Composite Anodes for Lithium-ion Batteries", Peng-Fei Cao, Michael Naguib, Zhijia Du, Eric Stacy, **Bingrui Li**, Tao Hong, Kunyue Xing, Dmitry N. Voylov, Jianlin Li, David L. Wood, III, Alexei P. Sokolov, Jagjit Nanda, Tomonori Saito. *ACS Appl. Mater. Interfaces*, **2018**, 10, 4, 3470–3478

"Super-Stretchable Polymeric Elastomers with Healable Properties and Functionality", Peng-Fei Cao†, **Bingrui Li**†, Tao Hong, Jacob Townsend, Zhe Qiang, Kunyue Xing, Konstantinos D. Vogiatzis, Yangyang Wang, Jimmy W. Mays, Alexei P. Sokolov, Tomonori Saito. *Advanced Functional Materials*, **2018**, 1800741

"Secondary Structure Mediated Hierarchy and Mechanics in Polyurea-peptide Hybrids", Lindsay E. Matolyak, Chase B. Thompson, **Bingrui Li**, Jong K. Keum, Jon E. Cowen, Richard S. Tomazin, and LaShanda T. J. Korley. **in revision**

Conference Presentations

"Super-stretchable polymeric elastomers with healable property and recoverable functionality", *ACS March 2018 Meeting*, oral

"Elastic multi-functional polyelectrolyte membrane", *ACS March 2018 Meeting*, poster

"Robust and elastic polymer membrane with tunable properties for gas separation", *ACS August 2017 Meeting*, poster