

Tomonori Saito

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Job

Oak Ridge National Laboratory	Oak Ridge, TN, U.S.A.
Distinguished R&D Staff	April 2024 – current
Senior R&D Staff	January 2021 – March 2024
R&D Staff	January 2017 – December 2020
R&D Associate	December 2012 – December 2016
Soft Matter Group Chemical Sciences Division	
Postdoctoral Research Associate	August 2010 – November 2012
Polymer Matrix Composites Group Materials Science and Technology Division	

Service

The University of Tennessee, Knoxville	Knoxville, TN, U.S.A.
Joint Faculty Associate Professor (Faculty Advisor)	2019-current
The Bredesen Center for Interdisciplinary Research and Graduate Education	

Education

The Pennsylvania State University	University Park PA, U.S.A.
Postdoctoral Research Associate	May 2008 – August 2010
Department of Materials Science and Engineering Department of Civil and Environmental Engineering Research Advisors: Prof. Bruce E. Logan (CEE), Prof. Michael A. Hickner (MATSE)	
Virginia Polytechnic Institute and State University	Blacksburg, VA, U.S.A.
Ph.D. Organic Polymer Chemistry	May 2008
Department of Chemistry Research Advisor: Prof. Timothy E. Long Dissertation: “Synthesis and Characterization of Multiphase Block Copolymers: Influence of Functional Groups in Macromolecular Architecture”	
Waseda University	Tokyo, Japan
M. S. Chemical Engineering	March 2003
B. S. Applied Chemistry	March 2001
The University of British Columbia	2001-2002, Vancouver, Canada

(Exchange program in M.S.)

Research Expertise

Dr. Tomonori Saito is a synthetic polymer chemist, who has extensive experience in the synthesis of well-defined polymers via living/controlled polymerization as well as post-modification of various polymers. His expertise has been applied to various projects at ORNL including polymer upcycling, vitrimers, flow battery, fuel cell membranes, ion-conducting polymers for batteries and battery binders, CO₂ separation membranes, polymer nanocomposites, additive manufacturing, polymer nanoparticles, elastomers, self-healing materials, thermal insulation materials, gas pipeline renewal, uranium extraction from seawater, carbon fiber composites, polyolefin-based carbon fibers, lignin based-carbon fibers, and lignin-based renewable thermoplastics. He has published more than 130 peer-reviewed articles (*h*-index 51), 14 patents issued (several were licensed.), won R&D 100 in 2012, 2016, 2019, 2021 as well as received the inventor of the year by Battelle in 2023.

His strength in research relies on the use of his skills in synthetic polymer chemistry to impact material sciences, energy, and chemical & environmental engineering applications. His polymer synthesis experience includes synthesis of block, graft, random copolymers with functional groups using living anionic polymerization, ATRP, RAFT, ROMP, conventional free radical polymerization, step-growth polymerization, and post-functionalization chemistry. His engineering expertise includes design, process and characterization of polymeric materials using various techniques for applications such as 3D printing, thermal insulation materials, renewable/upcycled plastics, carbon fibers, composites, gas pipe rehabilitation, CO₂ separation membranes, fuel cell, flow battery, self-healing materials, elastomers, metal adsorbents, ion-conducting polymers for energy storage, etc..

Current Research Focus

- Polymer Upcycling
- Polymer Composites
- SMART Gas Pipe Rehabilitation
- Self-healing and Dynamic Polymers (Vitrimers)
- Additive Manufacturing (Binger Jet 3D Printing, FDM, DIW)
- Polymer Electrolytes
- Energy Storage (Li-ion Battery, Flow Battery, Fuel Cell)
- Gas Separation Membrane
- Building Materials (Thermal Insulation)

He current leads projects as a lead PI on 1. Polymer Upcycling (BES), 2. New Frontier in Polymer Matrix Composites via Tailored Vitrimer Chemistry (EERE VTO), 3. Structural Materials-aided Advanced Renewal Technology for REPAIR (SMART REPAIR) (ARPA-E), 4. Self-healing films for vacuum insulation panel (EERE BTO, and TCF). He is a task lead on 1. Development of novel binders for binder jet 3D printing (EERE AMO), 2. Fuel Cell Membranes (PEMFC and AEMFC, EERE HFTO). He also has multiple projects as a co-PI 1. Development of facer and facer

bonding for thermal insulation foams, and development of R10 foams (EERE BTO), 2. Self-healing sealants (EERE BTO, and TCF), 3. Preinstall sealants for Prefab Components (EERE BTO), 4. Bio-based Foams (EERE BTO, and TCF), 5. High-Energy-Density, Organic Radical-Mediated Redox Flow Batteries (OE), and a several other projects.

Research Accomplishments

Peer-reviewed Publications (total 134)

2024

1. Xiao Zhao, Zoriana Demchuk, Jia Tian, Jiancheng Luo, Bingrui Li, Ke Cao, Alexei P. Sokolov, Diana Hun,* **Tomonori Saito***, Peng-FeiCao*, “Ductile adhesive elastomers with force-triggered ultra-high adhesion strength”, *Mater. Horiz.*, 2024, 11, 969-977
2. Xiaomin Tang, Changhao Liu, Jihua Chen, Rajeev Kumar, Christopher Bowland, **Tomonori Saito**, Brent Dial, Jong Keum*, Changwoo Do*, Xi Chelsea Chen*, “Probing the interface structure of block copolymer compatibilizers in semicrystalline polymer blends”, *J. App. Poly. Sci.*, 2024, e55178
3. Pardeep Kumar, Bobby G. Sumpter, **Tomonori Saito** and Robert J. Davis*, “Importance of hydrogen bonding in Base-Catalyzed transesterification reactions with vicinal diols,” *J. Catal.* 429, 115246 (2024)
4. Dustin Gilmer, Sungjin Kim, Desarae J Goldsby, Peeyush Nandwana, Amy Elliott*, **Tomonori Saito*** “Predictive Binder Jet Additive Manufacturing enabled by Clean Burn-off Binder Design” *Additive Manufacturing* 80, 103955 (2024)

2023

5. Jeffrey C. Foster*, Jackie Zheng, Md. Arifuzzaman, Md. Anisur Rahman, Joshua T. Damron, Chao Guan, Ilja Popovs, Nick Galan, Zoriana Demchuk, and **Tomonori Saito***, “Closed-loop recycling of semi-aromatic polyesters upcycled from poly(ethylene terephthalate)”, *Cell Reports Physical Sciences*, 2023, 4, 101734
6. Md Anisur Rahman,* Menisha Mahappu Korallalage, Christopher C. Bowland, Guang Yang, Catalin Gainaru, Bingrui Li, Sungjin Kim, Vivek Chawla, Natasha Ghezawi, Harry M Meyer III, Amit K. Naskar, Dayakar Penumadu, Alexei P Sokolov, **Tomonori Saito***, “Tough, recyclable carbon-fiber composites with exceptional interfacial adhesion via a tailored vitrimer-fiber interface”, *Cell Reports Physical Science* 2023, 4, 101695, **featured in multiple media**
7. Bingrui Li, Sirui Ge, Xiao Zhao, Qiyi Chen, Jia Tian, Diana Hun, Alexei P. Sokolov, **Tomonori Saito***, Pengfei Cao*, “Well-Tunable, 3D-printable, and Fast Autonomous Self-Healing Elastomers”, *Supramolecular Materials*, 2 (2023) 100042
8. Md. Arifuzzaman, Bobby G. Sumpter, Zoriana Demchuk, Changwoo Do, Mark A. Arnould, Md Anisur Rahman, Peng-Fei Cao, Ilja Popovs, Robert J. Davis, Sheng Dai, **Tomonori Saito***, "Selective deconstruction of mixed plastics by a tailored organocatalyst" *Mater. Horiz.*, 2023, 10, 3360–3368, DOI: 10.1039/d3mh00801k **Journal Front Cover, featured in multiple media such as ORNL, Chemistry World, eurekaalert, phys.org, newswise, sciencedaily, scincetimes etc.**
9. Catalin Gainaru, Rajeev Kumar, Ivan Popov, Md Anisur Rahman, Michelle Lehmann, Eric Stacy, Vera Bocharova, Bobby G. Sumpter, **Tomonori Saito**, Kenneth S. Schweizer, Alexei P. Sokolov, Mechanisms Controlling the Energy Barrier for Ion Hopping in Polymer Electrolytes, *Macromolecules* 2023, 56, 15, 6051–6059

10. Michelle Lehmann, Ethan Self, **Tomonori Saito**, Guang Yang, “Composite Membrane for Sodium Polysulfide Hybrid Redox Flow Batteries”, *Membranes* 13 (8), 700
11. Bingrui Li, Sirui Ge, Sheng Zhao, Kunyue Xing, Alexei P. Sokolov, Peng-Fei Cao* and **Tomonori Saito***, Puncture-Resistant Self-Healing Polymers with Multi-cycle Adhesion and Rapid Healability, *Mater. Horiz.*, 2023, 10, 2868–2875, **Journal Back Cover**
12. Jackie Zheng, Md Arifuzzaman, Xiaomin Tang, Xi Chelsea Chen*, **Tomonori Saito***, Recent Development of End-of-Life Strategies for Plastic in Industry and Academia: Bridging Their Gap for Future Deployment, *Mater. Horiz.*, 2023, 10, 1608–1624 **Journal Back Cover**
13. Syed Islam, Md. Arifuzzaman, Gernot Rother, Vera Bocharova, Robert Sacchi, Jacek Jakowski, Jingsong Huang, Iliia Ivanov, Ramesh Bhave, **Tomonori Saito**, David Sholl, “A Membrane Contactor Enabling Energy-efficient CO₂ Capture from Point Sources with Deep Eutectic Solvents” *Ind. Eng. Chem. Res.*, 2023, 62, 10, 4455–4465 **Journal Cover**
14. Bingrui Li, Peng-Fei Cao, **Tomonori Saito***, Alexei P. Sokolov*, “Intrinsically Self-Healing Polymers: From Mechanistic Insight to Current Challenges”, *Chem. Rev.* 2023, 123, 701–735, **Journal Cover**
15. Michelle Lehmann, Daniel Leonard, Jackie Zheng, Lilin He, Xiaomin Tang, Xi Chelsea Chen, Katie Heeyum Lim, Sandip Maurya, Yu Seung Kim,* and **Tomonori Saito***, Quaternized Polynorbomene Random Copolymers for Fuel Cell Devices, *ACS Appl. Energy Mater.* 2023, 6, 3, 1822–1833
16. Lu Han, Dustin B. Gilmer, Amy Elliott*, **Tomonori Saito***, “Spray coating for washout tooling by binder jet additive manufacturing”, *Composites Part B* 250, 2023, 110436
17. Shilun Gao, Zhenxi Li, Zhen Zhang, Bingrui Li, Xi Chelsea Chen, Guang Yang,, **Tomonori Saito**, Ming Tian, Huabin Yang, Peng-Fei Cao, Constructing a Multi-Functional Polymer Network for Ultra-Stable and Safe Li-metal Batteries, *Energy Storage Materials*, 55 (2023) 214–224
18. Jiadeng Zhu, Sheng Zhao, Jiancheng Luo, Wei Niu, Joshua T. Damron, Zhen Zhang, Md Anisur Rahman, Mark A. Amould, **Tomonori Saito**, Rigoberto Advincula, Alexei P. Sokolov, Bobby G. Sumpter, Peng-Fei Cao, “A Novel Dynamic Polymer Synthesis via Chlorinated Solvent Quenched Depolymerization”, *CCS Chem.* 2023, 5, 1841–1853

2022

19. Daniel P. Leonard, Michelle Lehmann, Jeffrey M. Klein, Ivana Matanovic, Cy Fujimoto, **Tomonori Saito***, and Yu Seung Kim*, Phenyl-Free Polynorbomenes for Potential Anion Exchange Ionomers for Fuel Cells and Electrolyzers, *Adv. Energy Mater.* 2022, 2203488
20. Jacob Fischer, Lu Han, **Tomonori Saito**, Mark Dadmun, When does a macromolecule transition from a polymer chain to a nanoparticle? *Nanoscale Adv.*, 2022, 4, 5164–5177
21. Zhengping Zhou, Sungjin Kim, Christopher C. Bowland, Bingrui Li, Natasha Ghezawi, Edgar Lara-Curzio, Ahmed Hassen, Amit K. Naskar, Md Anisur Rahman*, **Tomonori Saito***, “Unraveling a Path for Multi-Cycle Recycling of Tailored Fiber-reinforced Vitrimers Composites”, *Cell Reports Physical Science* 3, 101036, 2022, **featured in more than 10 media**
22. Michelle L. Lehmann, Guang Yang, Jagjit Nanda,* **Tomonori Saito***, “Unraveling Ion Transport in Trifluoromethanesulfonimide Pentablock Copolymer Membranes in Nonaqueous Electrolytes” *Macromolecules*, 2022, 55, 7740–7751
23. Lingyao L. Meng, Alexander S. Ivanov, Sungjin Kim, Xiao Zhao, Navin Kumar, Amanda Young-Gonzales, Tomonori Saito, Wim Bras, Kyle Gluesenkamp, and Vera Bocharova*, “Alginate–Sodium Sulfate

Decahydrate Phase Change Composite with Extended Stability”, *ACS Appl. Polym. Mater.* 2022, 4, 9, 6563–6571

24. Sungjin Kim, Md Anisur Rahman, Md Arifuzzaman, Dustin B. Gilmer, Bingrui Li, Jackson K. Wilt, Edgar Lara-Curzio, **Tomonori Saito***, Closed-loop Additive Manufacturing of Upcycled Commodity Plastic through Dynamic Crosslinking, *Sci. Adv.* 2022, 8, eabn6006, **featured in more than 20 media such as ORNL, eurekalert, phys.org, newswise, materials today etc.**
25. Michelle L. Lehmann, Landon Tyler, Ethan C. Self, Guang Yang, Jagjit Nanda*, **Tomonori Saito***, “Membrane Design for Non-Aqueous Redox Flow Batteries: Current Status and Path Forward”, *Chem* 8, 1–26, June 9, 2022
26. Jiancheng Luo, Zoriana Demchuk, Xiao Zhao, **Tomonori Saito**, Ming Tian, Alexei P. Sokolov,* Peng-Fei Cao, “Elastic vitrimers: Beyond thermoplastic and thermoset elastomers” *Matter* 5, 1391–1422, May 4, 2022
27. Guang Yang, Peng-Fei Cao, Ethan C. Self, Michelle Lehmann, Xi Chelsea Chen, Sheng Zhao, Sirui Ge, Chenhui Zhu, **Tomonori Saito**, Frank M. Delnick, Jagjit Nanda, “Selective Plasticization of Poly(ethylene oxide) (PEO) Block in Nanostructured Polystyrene–PEO–Polystyrene Triblock Copolymer Electrolytes” *Journal of The Electrochemical Society*, 2022 169 050506
28. Adrienne K. Blevins, Mengyuan Wang, Michelle L. Lehmann, Leiqing Hu, Shouhong Fan, Christopher M. Stafford, Jason P. Killgore, Haiqing Lin, **Tomonori Saito**, Yifu Ding, Photopatterning of two stage reactive polymer networks with CO₂-philic thiol–acrylate chemistry: enhanced mechanical toughness and CO₂/N₂ selectivity, *Polym. Chem.* 2022,13, 2495-2505
29. Xiaomin Tang, Changhao Liu, Jong Keum, Jihua Chen, Brent E. Dial, Yangyang Wang, Wan-Yu Tsai, Wim Bras, **Tomonori Saito**, Christopher C. Bowland, X. Chelsea Chen, “Upcycling of semicrystalline polymers by compatibilization: mechanism and location of Compatibilizers”, *RSC Adv.*, 2022, 12, 10886
30. Mohammadreza Mahmoudi, Sungjin Kim, Md. Arifuzzaman, **Tomonori Saito**, Corson L. Cramer, Majid Minary-Jolandan, Processing and 3D printing of SiCN polymer-derived ceramics, *Int J Appl Ceram Technol.* 2022,19, 939–948

2021

31. Ye Zhang, Guang Yang, Michelle L. Lehmann, Chaoshan Wu, Lihong Zhao, **Tomonori Saito**, Yanliang Liang, Jagjit Nanda, Yan Yao, “Separator Effect on Zinc Electrodeposition Behavior and Its Implication for Zinc Battery Lifetime,” *Nano Lett.* 2021, 21, 24, 10446–10452
32. Md Anisur Rahman, Christopher Bowland, Sirui Ge, Shree Ram Acharya, Sungjin Kim, Valentino R. Cooper, Xi Chen, Stephan Irle, Alexei Sokolov, Aditya Savara, **Tomonori Saito***, “Design of Tough Adhesive from Commodity Thermoplastics through Dynamic Crosslinking”, *Sci. Adv.* 2021; 7 : eabk2451, **featured in more than 20 media including Newsweek, ORNL, eurekalert, phys.org, newswire, ritzherald, newsbreak, National Geographic (Russia), Romanian TV and many others.**
33. Dustin B. Gilmer, Lu Han, Michelle L. Lehmann, Derek H. Siddel, Guang Yang, Azhad U. Chowdhury, Benjamin Doughty, Amy M. Elliott*, **Tomonori Saito***, “Additive Manufacturing of Strong Silica Sand Structures enabled by Polyethyleneimine Binder”, *Nat Comm*, 2021, 12, 5144, **featured in Nat Comm Editor’s highlights, Nat Comm’s additive manufacturing articles’ highlight, featured in multiple media including Mashable, ORNL, Phys.org, Defense Digest, STEM Magazine: Chosen for Top 10 short video by Springer Nature**

34. Corson L. Cramer, Jackson K. Wilt, Quinn A. Campbell, Lu Han, **Tomonori Saito**, Andrew T. Nelson, “Accuracy of stereolithography printed alumina with digital light processing”, *Open Ceramics* 8 (2021) 100194
35. Subarna Samanta, Sungjin Kim, **Tomonori Saito**, Alexei P. Sokolov, “Polymers with Dynamic Bonds: Adaptive Functional Materials for Sustainable Future”, *J. Phys. Chem. B* 2021, 125, 33, 9389–9401, **Journal Cover**
36. Martin Tress, Maximilian Vielhauer, Pierre Lutz, Rolf Mülhaupt, Friedrich Kremer, Kunyue Xing, Sirui Ge, Pengfei Cao, **Tomonori Saito**, Alexei Sokolov, “Polymer Dynamics in Nanostructured Environments: Structure-Property Relations Unraveled by Dielectric Spectroscopy”, *ACS Symposium Series* Vol. 1375, Chapter 10 p 223-238
37. Christine Fisher, Bruce J. Warmack, Yongchao Yu, Lydia N. Skolrood, Kai Li, Pooran C. Joshi, **Tomonori Saito**, Tolga Aytug, “All-aerosol-jet-printed highly sensitive and selective polyaniline-based ammonia sensors: a route toward low-cost, low-power gas detection”, *J Mater Sci*, 2021, 56 (22), 12596-12606
38. X. Chelsea Chen, Yiman Zhang, Laura C. Merrill, Charles Soulen, Michelle L. Lehmann, Jennifer L. Schaefer, Zhijia Du, **Tomonori Saito**, Nancy J. Dudney, “Gel composite electrolyte – an effective way to utilize ceramic fillers in lithium batteries”, *J. Mater. Chem. A*, 2021, 9, 6555–6566
39. Guang Yang*, Michelle L. Lehmann, Sheng Zhao, Bingrui Li, Sirui Ge, Peng-Fei Cao, Frank M. Delnick, Alexei P. Sokolov, **Tomonori Saito***, Jagjit Nanda*, Anomalously high elastic modulus of a poly(ethylene oxide)-based composite electrolyte, *Energy Storage Materials* 35 (2021) 431–442
40. Jackson K. Wilt, Dustin Gilmer, Sungjin Kim, Brett G. Compton, **Tomonori Saito***, “Direct Ink Writing Techniques for In-situ Gelation and Solidification”, *MRS Communications*, 2021 (11) 106–121
41. Bingrui Li, Sheng Zhao, Jiadeng Zhu, Sirui Ge, Kunyue Xing, Alexei P. Sokolov, **Tomonori Saito***, Peng-Fei Cao*, “Rational Polymer Design of Stretchable Poly(ionic liquid)s Membranes for Dual Applications”, *Macromolecules* 2021, 54, 896–905, **Journal Cover**
42. Martin Tress, Sirui Ge, Kunyue Xing, Peng-Fei Cao, **Tomonori Saito**, Anne-Caroline Genix, Alexei P. Sokolov, “Turning Rubber into a Glass: Mechanical Reinforcement by Microphase Separation”, *ACS Macro Lett.* 2021, 10, 2, 197–202

2020

43. Sheng Zhao, Yiman Zhang, Hoang Pham, Jan-Michael Y. Carrillo, Bobby G. Sumpter, Jagjit Nanda, Nancy J. Dudney, **Tomonori Saito**, Alexei P. Sokolov*, Peng-Fei Cao*, “Improved Single-Ion Conductivity of Polymer Electrolyte via Accelerated Segmental Dynamics”, *ACS Applied Energy Materials* 2020, 3, 12, 12540-12548
44. Anjali N. Preman, Hyocheol Lee, Jungwoo Yoo, Il Tae Kim*, **Tomonori Saito***, Suk-kyun Ahn* “Progress of 3D Network Binders in Silicon Anodes for Lithium Ion Batteries” *J. Mater. Chem. A*, 2020, 8, 25548-25570
45. Zhen Zhang, Natasha Ghezawi, Bingrui Li, Sirui Ge, Sheng Zhao, **Tomonori Saito***, Diana Hun*, Peng-Fei Cao*, “Autonomous Self-Healing Elastomers with Unprecedented Adhesion Force”, *Advanced Functional Materials*, 2020, 2006298, **Journal Cover, Frontispiece**
46. Corson L. Cramer, Herb Armstrong, Alexis Flores-Betancourt, Lu Han, Amy M. Elliott, Edgar Lara-Curzio, **Tomonori Saito**, Kashif Nawaz, “Processing and properties of SiC composites made via binder jet 3D printing and infiltration and pyrolysis of preceramic polymer”, *Int. J. Ceramic Eng. Sci.* 2020, 2, 320–331.
47. Umesh M. Shrestha, Lu Han, **Tomonori Saito**, Kenneth S. Schweizer, Mark D. Dadmun, “Mechanism of Soft Nanoparticle Diffusion in Entangled Polymer Melts” *Macromolecules* 2020 53, 17, 7580–7589

48. Lu Han*, Michelle L. Lehmann, Jiadeng Zhu, Tianyi Liu, Zhengping Zhou, Xiaomin Tang, Chien-Te Hsieh, Alexei P. Sokolov, Pengfei Cao, Xi Chen, **Tomonori Saito***, “Recent developments and challenges in hybrid solid electrolytes for lithium-ion batteries” *Front. Energy Res.* 2020, 8, 202
49. Sahar Rostom, B. Tyler White, Guangcui Yuan, **Tomonori Saito**, Mark D. Dadmun, “Polymer Chain Diffusion in All-Polymer Nanocomposites: Confinement vs Chain Acceleration”, *J. Phys. Chem. C* 2020, 124, 18834–18839
50. Dustin Gilmer, Lu Han, Eunice Hong, Derek Siddel, Alexander Kisliuk, Shiwang Cheng, Dan Brunermer, Amy Elliott*, **Tomonori Saito***, “An in-situ crosslinking binder for binder jet additive manufacturing”, *Additive Manufacturing* 35 (2020) 101341
51. Peng-Fei Cao,* Bingrui Li, Guang Yang, Sheng Zhao, Jacob Townsend, Kunyue Xing, Zhe Qiang, Konstantinos D. Vogiatzis, Alexei P. Sokolov, Jagjit Nanda, **Tomonori Saito***, “Elastic Single-Ion Conducting Polymer Electrolytes: Toward a Versatile Approach for Intrinsically Stretchable Functional Polymers”, *Macromolecules* 2020, 53, 3591–3601
52. Shilun Gao, Feiyuan Sun, Alexander Brady, Yiyang Pan, Andrew Erwin, Dandan Yang, Vladimir Tsukruk Andrew G. Stack, **Tomonori Saito**, Huabin Yang, Peng-Fei Cao, “Ultra-efficient polymer binder for silicon anode in high-capacity lithium-ion batteries”, *Nano Energy* 73 (2020) 104804
53. Sirui Ge, Martin Tress, Kunyue Xing, Peng-Fei Cao, **Tomonori Saito**, Alexei P. Sokolov, “Viscoelasticity in associating oligomers and polymers: experimental test of the bond lifetime renormalization model”, *Soft Matter*, 2020, 16, 390–401
54. Michelle L. Lehmann, Guang Yang*, Jagjit Nanda*, **Tomonori Saito***, “Well-designed Crosslinked Polymer Electrolyte Enables High Ionic Conductivity and Enhanced Salt Solvation”, *Journal of The Electrochemical Society*, 2020, 16,7 070539

2019

55. Tao Hong, Peng-Fei Cao*, Sheng Zhao, Bingrui Li, Connor Smith, Michelle Lehmann, Andrew J. Erwin, Shannon M. Mahurin, Surendar R. Venna, Alexei P. Sokolov, **Tomonori Saito***, “Tailored CO₂-philic Gas Separation Membranes via One-pot Thiol-ene Chemistry”, *Macromolecules*, 2019, 52, 5819–5828
56. Martin Tress, Kunyue Xing, Sirui Ge, Pengfei Cao, **Tomonori Saito**, Alexei Sokolov, “What dielectric spectroscopy can tell us about supramolecular networks” *Eur. Phys. J. E*, 2019, 42, 133
57. Michelle L. Lehmann, Guang Yang*, Dustin Gilmer, Kee Sung Han, Ethan C. Self, Rose E. Ruther, Sirui Ge, Bingrui Li, Vijayakumar Murugesan, Alexei P. Sokolov, Frank M. Delnick, Jagjit Nanda*, **Tomonori Saito***, “Tailored Crosslinking of Poly(Ethylene Oxide) Enables Mechanical Robustness and Improved Sodium-Ion Conductivity”, *Energy Storage Materials*, 2019, 21, 85–96
58. Benjamin Doughty, Anne-Caroline Genix, Ivan Popov, Bingrui Li, Sheng Zhao, **Tomonori Saito**, Daniel A. Lutterman, Robert L. Sacci, Bobby G. Sumpter, Zaneta Wojnarowska, Vera Bocharova, “Structural correlations tailor conductive properties in polymerized ionic liquids” *Phys. Chem. Chem. Phys.*, 2019, 21(27), 14775-14785
59. Anne-Caroline Genix, Vera Bocharova, Bobby Carroll, Michelle Lehmann, **Tomonori Saito**, Susan Krueger, Lilin He, Philippe Dieudonné-George, Alexei P. Sokolov, and Julian Oberdisse, “Understanding the Static Interfacial Polymer Layer by Exploring the Dispersion States of Nanocomposites”, *ACS Appl. Mater. Interfaces*, 2019, 11 (19), 17863–17872

60. Peng-Fei Cao,* Guang Yang, Bingrui Li, Yiman Zhang, Sheng Zhao, Shuo Zhang, Andrew Erwin, Zhengcheng Zhang, Alexei P. Sokolov, Jagjit Nanda,* **Tomonori Saito***, “Rational Design of a Multifunctional Binder for High-Capacity Silicon-Based Anodes”, *ACS Energy Lett.* 2019, 4, 1171–1180
61. Halie J. Martin, B. Tyler White, Guangcui Yuan, **Tomonori Saito**, Mark D. Dadmun, “Relative Size of the Polymer and Nanoparticle Controls Polymer Diffusion in All-Polymer Nanocomposites”, *Macromolecules*, 2019, 52, 2843–2852
62. Kaushik Biswas*, Dustin Gilmer, Natasha Ghezawi, Peng-Fei Cao, **Tomonori Saito***, “Demonstration of self-healing barrier films for vacuum insulation panels”, *Vacuum* 164 (2019) 132–139
63. Guang Yang, Robert L. Sacci, Ilia N. Ivanov, Rose E. Ruther, Kevin A. Hays, Yiman Zhang, Peng-Fei Cao, Gabriel M. Veith, Nancy J. Dudney, **Tomonori Saito**, Daniel T. Hallinan, Jagjit Nanda, Probing Electrolyte Solvents at Solid/Liquid Interface Using Gap-Mode Surface-Enhanced Raman Spectroscopy, *Journal of The Electrochemical Society*, 166 (2) A1-A10 (2019)

2018

64. Kunyue Xing, Martin Tress, Peng-Fei Cao, Fei Fan, Shiwang Cheng, **Tomonori Saito**, Alexei P. Sokolov, “The Role of Chain-End Association Lifetime in Segmental and Chain Dynamics of Telechelic Polymers”, *Macromolecules*, 2018, 51 (21), pp 8561–8573
65. Halie J. Martin, B. Tyler White, Huiqun Wang, Jimmy Mays, **Tomonori Saito**, Mark D. Dadmun, Effect of Solvent Quality and Monomer Water Solubility on Soft Nanoparticle Morphology, Chapter 7, pp 117-137, *ACS Symposium Series #1296*, Gels and Other Soft Amorphous Solids
66. Rose E. Ruther, Guang Yang, Frank M. Delnick, Zhijiang Tang, Michelle L. Lehmann, **Tomonori Saito**, Yujie Meng, Thomas A. Zawodzinski Jr., and Jagjit Nanda, “Mechanically Robust, Sodium-Ion Conducting Membranes for Nonaqueous Redox Flow Batteries”, *ACS Energy Lett.*, 2018, 3 (7), 1640–1647
67. Alexander I. Wiechert, Wei-Po Liao, Eunice Hong, Candice E. Halbert, Sotira Yiacoumi, **Tomonori Saito***, Costas Tsouris*, “Influence of hydrophilic groups and metal-ion adsorption on polymer-chain conformation of amidoxime-based uranium adsorbents”, *Journal of Colloid and Interface Science* 524 (2018) 399–408
68. 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***, “Super-Stretchable, Self-Healing Polymeric Elastomers with Tunable Properties”, *Advanced Functional Materials*, 2018, 1800741
69. Kevin A. Hays, Rose E. Ruther, Alexander J. Kukay, Pengfei Cao, **Tomonori Saito**, David L. Wood III, Jianlin Li, “What makes lithium substituted polyacrylic acid a better binder than polyacrylic acid for silicon-graphite composite anodes?”, *Journal of Power Sources* 384 (2018) 136–144
70. Kunyue Xing, Martin Tress, Pengfei Cao, Shiwang Cheng, **Tomonori Saito**, Vladimir N. Novikov, Alexei P. Sokolov, “Hydrogen-bond strength changes network dynamics in associating telechelic PDMS”, *Soft Matter*, 2018, 14, 1235-1246
71. Konstantinos Misichronis, Weiyu Wang, Shiwang Chen, Yangyang Wang, Umesh Shrestha, Mark Dadmun, Jimmy W. Mays, **Tomonori Saito***, “Design, Synthesis and Characterization of Lightly Sulfonated Multigraft Acrylate-based Copolymer Superelastomers” *RSC Advances*, 2018, 8, 5090-5098
72. 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***, “Effect of Binder

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127. Xin Wang, Shaoan Cheng, Yujie Feng, Matthew D. Merrill, **Tomonori Saito**, Bruce E. Logan, “Use of Carbon Mesh Anodes and the Effect of Different Pretreatment Methods on Power Production in Microbial Fuel Cells” *Environmental Science & Technology* 2009, 43(17), 6870-6874.
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132. **Tomonori Saito**, Satoshi Tsuneda, Kyoichi Saito, Akira Hirata, Kazuya Uezu, Shin-ya Nishiyama, Kaori Saito, Kazuyuki Sugita, Masao Tamada and Takanobu Sugo, “Removal of Antimony using Polyol-Ligand-Containing Porous Hollow-Fiber Membranes,” *Separation Science and Technology*, 2004, 39(13), 3011-3022.
133. Shin-ya Nishiyama, Kaori Saito, Kyoichi Saito, Kazuyuki Sugita, **Tomonori Saito**, Satoshi Tsuneda, Akira Hirata, Masao Tamada and Takanobu Sugo, “High-speed Recovery of Antimony using Chelating Porous Membrane,” *Journal of Membrane Science*, 2003, 214(2), 275-281.
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Issued Patent

1. **Tomonori Saito**, Zhengping Zhou, Md Anisur Rahman, Recyclable crosslinked polymeric compositions, US Patent No. 11945947, April 2, 2024
2. **Tomonori Saito**, Amy M Elliott, Indirect additive manufacturing process, US Patent No. 11,642,841, May 9, 2023
3. **Tomonori Saito**, Lu Han, Amy M Elliott, Dustin B. Gilmer, Water soluble barrier coatings for washout tooling for a composite layup, US Patent No. 11524427, Dec, 13, 2022
4. Kaushik Biswas, David Lee Wood III, Kelsey M Grady, Natasha B Ghezawi, Pengfei Cao, **Tomonori Saito**, “Roll-to-roll slot die coating method to create interleaving multi-layered films with chemical slurry coatings” US Patent No. 11446915, Sep 20, 2022 *licensed on November 2023*
5. Kaushik Biswas, Pengfei Cao, **Tomonori Saito**, “Self-healing barrier films for vacuum insulation panels”, US Patent No. 11287079, Mar. 29, 2022 *licensed on November 2023*
6. **Tomonori Saito**, Amy M Elliott, Daniel T Brunermer, Dustin Blake Gilmer, Michelle Lehmann, Huayun Yu, “Indirect additive manufacturing process using amine-containing adhesive polymers” US Patent No. 11254617, February 22, 2022, *licensed on 2019*
7. **Tomonori Saito**, Pengfei Cao, “Super-stretchable self-healing polymer” US Patent No. 11,008,461, May 18, 2021
8. **Tomonori Saito**, Pengfei Cao, Jagjit Nanda,” Block graft copolymer binders and their use in silicon-containing anodes of lithium-ion batteries” US Patent No. 11,005,101, May 11, 2021
9. **Tomonori Saito**, Pengfei Cao, Jagjit Nanda, “Crosslinked functional binders and their use in silicon-containing anodes of lithium-ion batteries” US Patent No. 10897045 B2, Jan 19 2021
10. Sheng Dai, Suree Brown, **Tomonori Saito**, “Surface-Functionalized Polyolefin Fibers and Their Use in Methods For Extracting Metal Ions from Liquid Solutions” US Patent No. 10391472, August 27, 2019
11. Tao Hong, Sabornie Chatterjee, Brian K. Long, De-en Jiang, Shannon M. Mahurin, Jimmy W. Mays, Alexei Sokolov, **Tomonori Saito**, “Cross-linked Polymeric Membranes for Carbon Dioxide Separation” US Patent No. 9873094, January 23, 2018
12. Amit K. Naskar, Marcus A. Hunt, **Tomonori Saito**, “Methods for preparation of carbon fibers from polyolefin fiber precursor” US Patent No. 9828770, November 27, 2017
13. Amit K. Naskar, Marcus A. Hunt, **Tomonori Saito**, “Methods for preparation of carbon fibers from polyolefin fiber precursors, and carbon fiber made thereby” US Patent No. 9096955, August 4, 2015
14. Amit K. Naskar, **Tomonori Saito**, Joseph M. Pickel, Frederick S. Baker, Cliff Eberle, Robert E. Norris, Jr., Jonathan R. Mielenz, “Lignin-Derived Thermoplastic Co-Polymers and Methods of Preparation” U.S. Patent No. 8,748,537 issued: June 10, 2014 *licensed on March 2015*

Mentoring History

He currently mentors a few staff members, 4 postdocs, and 4 graduate students. The list of current and past advisees with current institution is listed as follows:

Postdoctoral Advisees:

Dr. Zhenbin Niu, currently at Dow Corning
Dr. Sabornie Chatterjee, currently at Firmenich
Dr. Casey Johnson, Amy Research Laboratory, then currently at DuPont
Dr. Pengfei Cao, a staff at Oak Ridge National Laboratory, then a professor at Beijing University of Chemical Technology
Dr. Konstantinos Misichronis, currently at BIC
Dr. Lu Han, currently at Kaneka
Dr. Md Anisur Rahman, a staff at Oak Ridge National Laboratory
Dr. Sungjin Kim, a staff Oak Ridge National Laboratory, then an assistant professor at The University of New Mexico
Dr. Md. Arifuzzaman, a founder of a start-up, Re-Du
Dr. Ain Uddin, Oak Ridge National Laboratory
Dr. Ke Cao, Oak Ridge National Laboratory
Dr. Bokyung Park, currently at Huntsman
Dr. Nick Glan, Oak Ridge National Laboratory

Postmaster Advisees:

Mr. Bingrui Li, graduate school, UTK
Ms. Eunice Hong, currently at Acella Performance Materials

Postbachelor Advisees:

Mr. Tyler White, graduate school, Virginia Tech
Dr. Michelle Lehmann, graduate school, UTK, then a staff at ORNL
Ms. Natasha Ghezawi, currently at graduate school, UTK

Graduate Student Advisees:

Dr. Tao Hong, University of Tennessee, Knoxville, currently an assistant professor at Xi'an Jiaotong University
Dr. Michelle Lehmann, University of Tennessee, Knoxville, currently a technical staff member at ORNL
Dr. Dustin Gilmer, University of Tennessee, Knoxville, currently a faculty at University of Tennessee, Knoxville
Mr. Bingrui Li, University of Tennessee, Knoxville
Ms. Natasha Ghezawi, University of Tennessee, Knoxville
Mr. Jackie Zheng, University of Tennessee, Knoxville

Undergraduate Student (SULI or HERE) Advisees (indicating their next career step):

Ms. Sophia Lai, graduate school at Harvard University (SULI from Cornell)
Mr. Tyler White, graduate school at Virginia Tech (SULI from UTK)
Mr. Christopher Scanlon, graduate school at University of Southern Mississippi (SULI from Columbus State)
Mr. Connor Smith (SULI from Cornell)
Mr. Jay Hingu (SULI from New Jersey College)
Mr. Leo Parsons, graduate school at UC Davis (SULI from Cal Poly)
Mr. Dustin Gilmer, graduate school at UTK (SULI and HERE from East Tennessee State)
Ms. Michelle Lehmann, graduate school at UTK (SULI and HERE from UTK)
Mr. Hoang Pham, graduate school at UC Davis (HERE from Colorado College)
Mr. Tony Su, graduate school at Northwestern Univ (HERE from Grinnell College)
Mr. Alex Huynh (SULI from U of Houston)
Ms. Maria Furukawa, SOLVAY (SULI from Georgia Tech), then graduate school at UNC Chapel Hill

Mr. Benjamin Stacy, graduate school at U of Texas Austin (SULI from U of Kentucky)
 Ms. Lauryn Carver, graduate school at U of Chicago (SULI from U of Oklahoma)
 Ms. Christine Fisher, graduate school at CUNY (HERE from CUNY)
 Mr. Jackson Wilt (HERE and SULI from UTK), Fulbright Scholar in Netherland, graduate school at Harvard University
 Ms. Sylvie Blanton (SULI from Georgia Tech)
 Ms. Mairead Boucher (SULI from Ave Maria University)
 Ms. Christine Rukeyser (ECO from The University of Tennessee, Chattanooga)

Awards and Membership

2023	Battelle - ORNL Inventor of the Year, Tomonori Saito
2022	ORNL Award, Research Accomplishment, Tomonori Saito
2022	ORNL Award, Outstanding Scholarly Output, Amy Elliott, Tomonori Saito , Michelle Lehmann, Desarae Goldsby, Guang Yang and Benjamin Doughty
2022	ORNL BTSD 2022 Outstanding ORNL Collaborator Award, Tomonori Saito
2021	2021 R&D 100, “Autonomous self-healing sealant”, Diana Hun, Pengfei Cao, Tomonori Saito , Zhen Zhang, Bingrui Li, Natasha Ghezawi and Zoriana Demchuk
2019	2019 R&D 100, “High Strength Binder System for Additive Manufacturing”, Tomonori Saito , Amy Elliott, Dustin Gilmer, Michelle Lehmann, Lu Han, Rick Lucas, Dan Brunermer
2017	ORNL Research Team Award, Carter Abney, Vyacheslav Bryantsev, Christopher J. Janke, Sheng Dai, Richard Mayes, Tomonori Saito , Costas Tsouris
2016	2016 R&D 100, “U Grabber”, Sheng Dai, Suree Brown, Robin Rogers, Christopher J. Janke, Richard Mayes, Tomonori Saito , Ronnie Hanes
2012	2012 R&D 100, “HiCap Adsorbents”, Christopher J. Janke, Yatsandra Oyola, Sheng Dai, Chris Bauer, Richard Mayes, Tomonori Saito , Xiao-Guang Sun, Costas Tsouris, Jim Brang, Jeff Haggard
2006.5	ACS Polymer Division Travel Award – POLY Biennial Meeting
2005.1- 2005.6	MII (<i>Macromolecules and Interfaces Institute at Virginia Tech</i>) Frontiers in Graduate Research Fellowships
2003.3.5	Best Research Award (Kurita award) in 2003 at 37 th Japan Society on Water Environment Conference in Kumamoto, Japan, Mar. 3-7, 2003
2005 -	Member of American Chemical Society (ACS) (POLY, PMSE)
2016 -	Member of Materials Research Society (MRS)
2018 -	Member of North American Membrane Society (NAMS)
2018 -	Member of the American Institute of Chemical Engineers (AIChE)

Synergistic Activities:

- Oak Ridge National Laboratory, Distinguished Staff Fellow Committee, 2018-2021
- Georgia Tech, Polymer Depolymerization MURI Advisory Panel, 2020-
- DOE EERE AMMTO SUPR Verification Team, 2022-
- ACS Division of Polymer Chemistry, Webinar Committee (Chair 2023-), 2019 –

- Organizer of Symposiums at ACS National Meetings, MRS Meetings, and Euromat. Organizer for ACS CCC: “Sustainable Polymers: A Multidisciplinary Challenge” 2022-2023
- Contributor to the workshop report and factual document for DOE BES Roundtable on Chemical Upcycling of Polymers
- Serving as a reviewer for many proposals and many journals such as *Nature*, *Science*, *Science Advances*, *Nature Communications*, *Nature Sustainability*, *JACS*, *Advanced Materials*, *Angewandte Chemie*, *Advanced Functional Materials*, *Materials Horizons*, *Energy Storage Materials*, *Macromolecules*, *Additive Manufacturing*, *ACS Applied Interfaces*, *J. Mat. Chem. A.*, *ACS Applied Energy Materials*, *Green Chemistry*, *Chemical Engineering Journal*, etc.