

Youngbum Lee

Postdoctoral Researcher | Materials Research Laboratory
University of California, Santa Barbara
447-902-2834 | yblee@ucsb.edu | Santa Barbara, CA
Google Scholar | ORCID: 0009-0006-8996-0543

Education

University of Illinois Urbana Champaign (UIUC) Ph.D., Materials Science and Engineering Thesis: Self-Healing Thermoset Polymers and Embedded 3D Printing via Chemical Activation Advisor: Dr. Paul V. Braun	Urbana, Illinois, USA Aug. 2019 – Aug. 2024
Seoul National University (SNU) M.S., Chemical and Biological Engineering Thesis: Transparent and Stretchable Non-invasive Biochemical and Physiological Sensor System for Continuous Monitoring of Diabetes Mellitus Advisor: Dr. Dae-Hyeong Kim	Seoul, South Korea Mar. 2013 – Feb. 2015
B.S., Chemical and Biological Engineering	Mar. 2009 – Feb. 2013

Academic / Research Appointments

University of California, Santa Barbara (UCSB) Postdoctoral Researcher, Materials Research Laboratory Advisor: Dr. Craig J. Hawker	Santa Barbara, California, USA Sept. 2024 – Present
Korea Research Institute of Chemical Technology (KRICT) Researcher, Thin Film Materials Research Center	Daejeon, South Korea Mar. 2015 – Mar. 2018

Research Interests

Polymer Chemistry & Network Materials • Molecular Architecture • Interfacial Polymer Science • Sustainable Materials • Advanced Manufacturing

Honors & Awards

Winner, 6th Annual Postdoc Talk Competition in Polymer Research, Georgia Tech SPN	2026
Alan J. Heeger Fellowship, Materials Research Laboratory & CNSI, UC Santa Barbara	2026
Schmidt Science Fellows Finalist, Schmidt Science Fellows Program, USA	2025
Racheff-Intel Award, University of Illinois Urbana Champaign, USA	2024
Kwanjeong Educational Foundation Fellowship, Korea	2019 – 2023
Outstanding Paper Award, Korea Research Institute of Chemical Technology, Korea	2017
Superior Presentation Awards, Materials Research Society of Korea	2016
The National Scholarship for Science and Engineering, Korea	2009 – 2012

Publications

First-Author Publications (8)

*Equal contribution.

- Y. B. Lee**, Y. S. Kim, C. Chen, M. T. Hossain, B. A. Suslick, R. H. Ewoldt, S. H. Tawfick, J. S. Moore, N. R. Sottos, P. V. Braun. "Multimaterial 3D Printing in Activating Bath Enables In-Situ Polymerization of Thermosets with Intricate Geometries and Diverse Elastic Behaviors." *Advanced Materials*, 37, 202508568 (2025).
- Y. B. Lee**, B. A. Suslick, D. de Jong, G. O. Wilson, J. S. Moore, N. R. Sottos, P. V. Braun. "Self-healing Polydicyclopentadiene Thermosets Prepared via Frontal Polymerization." *Advanced Materials*, 36, 2309662 (2024).

6. **Y. B. Lee**, K. M. Chang, G. O. Wilson, H. M. Andersson, J. S. Moore, N. R. Sottos, P. V. Braun. “Self-Healing Polymers.” *Encyclopedia of Polymer Science and Engineering*, 1, (2023).
5. S. J. Lee*, **Y. B. Lee***, Y. R. Lim, J. K. Han, I. S. Jeon, G. Bae, Y. Yoon, W. Song, S. Myung, J. Lim, K.-S. An, S. S. Lee. “High Energy Electron Beam Stimulated Nanowelding of Silver Nanowire Networks Encapsulated with Graphene for Flexible and Transparent Electrodes.” *Scientific Reports*, 9, 9376 (2019).
4. **Y. B. Lee***, S. K. Kim*, S. Ji, W. Song, H.-S. Chung, M. K. Choi, M. Lee, S. Myung, J. Lim, K.-S. An, S. S. Lee. “Facile Microwave Assisted Synthesis of Vastly Edge Exposed 1T/2H-MoS₂ with Enhanced Activity for Hydrogen Evolution Catalysis.” *Journal of Materials Chemistry A*, 7, 3563–3569 (2019).
3. **Y. B. Lee**, S. K. Kim, Y. R. Lim, I. S. Jeon, W. Song, S. Myung, S. S. Lee, J. Lim, K.-S. An. “Dimensional Hybrid Structures of 2D Materials with ZnO Nanostructures via pH-Mediated Hydrothermal Growth for Flexible UV Photodetectors.” *ACS Applied Materials and Interfaces*, 9, 15031 (2017).
2. **Y. B. Lee***, J. K. Han*, S. Noothongkaew, S. K. Kim, W. Song, S. Myung, S. S. Lee, J. Lim, S. D. Bu, K.-S. An. “Toward Arbitrary-Direction Energy Harvesting through Flexible Piezoelectric Nanogenerators Using Perovskite PbTiO₃ Nanotube Arrays.” *Advanced Materials*, 29, 1604500 (2017).
1. H. Lee*, T. K. Choi*, **Y. B. Lee***, H. R. Cho, R. Ghaffari, L. Wang, J. Choi, T. D. Chung, N. Lu, T. Hyeon, S. H. Choi, D.-H. Kim. “A Graphene-Based Electrochemical Device with Thermoresponsive Microneedles for Diabetes Monitoring and Therapy.” *Nature Nanotechnology*, 11, 566 (2016).

Co-Author Publications (16)

16. P. T. Getty, **Y. B. Lee**, T. Eom, C. A. D’Ambra, C. J. Hawker, C. M. Bates. “Tunable Relaxation in Hydrosilylation-Compatible Polyborosiloxane Network via Crosslinker Design.” *ACS Macro Letters*, 15, 1279–1285 (2026).
15. M. T. Hossain, Y. S. Kim, P. Layek, P. Krishnan, **Y. B. Lee**, M. Zhu, S. Singh, P. H. Geubelle, P. V. Braun, J. W. Baur, N. R. Sottos, S. H. Tawfick, R. H. Ewoldt. “Embedded Direct Ink Writing of Thermoset and Elastomeric Polymers via Frontal Polymerization.” *Advanced Functional Materials*, Accepted (2026).
14. H.-G. Seong, M. Xu, H. Beech, **Y. B. Lee**, K. Iwaso, C. J. Hawker. “Embedding Diazirine-Based Carbene Precursors into Polyolefins via Catalyst-Tuned Olefin Metathesis.” *Polymer Chemistry*, 17, 3809–3815 (2026).
13. S. Ji, C. Park, **Y. B. Lee**, S. K. Kim, K.-S. An, S. S. Lee. “Sorption of Hazardous Industrial Organic Liquids with Environmentally Friendly Functionalized Cellulosic Sorbents.” *Journal of Polymer Engineering*, 43, 243–253 (2023).
12. Y. Ham, N. J. Fritz, G. Hyun, **Y. B. Lee**, J. S. Nam, I.-D. Kim, P. V. Braun, S. Jeon. “3D Periodic Polyimide Nano-Networks for Ultrahigh-Rate and Sustainable Energy Storage.” *Energy and Environmental Science*, 14, 5894–5902 (2021).
11. Y. R. Lim, J. K. Han, S. K. Kim, **Y. B. Lee**, Y. Yoon, S. J. Kim, B. K. Min, Y. Kim, C. Jeon, S. Won, J.-H. Kim, W. Song, S. Myung, S. S. Lee, K.-S. An, J. Lim. “Roll-to-Roll Production of Layer-Controlled Molybdenum Disulfide: A Platform for 2D Semiconductor-Based Industrial Applications.” *Advanced Materials*, 30, 1705270 (2018).
10. Y. Yoon, **Y. B. Lee**, S. K. Kim, W. Song, S. Myung, J. Lim, S. S. Lee, H. Yoo, K.-S. An. “Selective Liquid-Phase Extraction of Carboxylate-Rich Graphene Quantum Dots from Graphene Oxide Dispersions.” *Chemistry Select*, 3(1), 321–327 (2018).
9. S. Noothongkaew, J. K. Han, **Y. B. Lee**, O. Thumthan, K.-S. An. “Au NPs Decorated TiO₂ Nanotubes Array Candidate for UV Photodetectors.” *Progress in Natural Science: Materials International*, 27(6), 641–646 (2017).
8. S. K. Kim, W. Song, S. Ji, Y. R. Lim, **Y. B. Lee**, S. Myung, J. Lim, K.-S. An, S. S. Lee. “Synergetic Effect at the Interfaces of Solution Processed MoS₂-WS₂ Composite for Hydrogen Evolution Reaction.” *Applied Surface Science*, 425, 241 (2017).
7. Y. R. Lim, **Y. B. Lee**, S. K. Kim, J. Kim, Y. Kim, C. Jeon, W. Song, S. Myung, S. S. Lee, K.-S. An, J. Lim. “Rational Design of Multifunctional Devices based on Molybdenum Disulfide and Graphene Hybrid Nanostructures.” *Applied Surface Science*, 392, 557–561 (2017).
6. Y. R. Lim, W. Song, **Y. B. Lee**, S. K. Kim, J. K. Han, S. Myung, S. S. Lee, K.-S. An, C.-J. Choi, J. Lim. “Horizontally-Connected ZnO-Graphene Hybrid Films for Multifunctional Devices.” *Applied Surface Science*, 379, 238–241 (2016).
5. Y. R. Lim, W. Song, J. K. Han, **Y. B. Lee**, S. J. Kim, S. Myung, S. S. Lee, K.-S. An, C.-J. Choi, J. Lim. “Wafer-Scale, Homogeneous MoS₂ Layers on Plastic Substrates for Flexible Visible-Light Photodetectors.” *Advanced Materials*, 28, 5025 (2016).

4. S. J. Kim, M.-A. Kang, S. H. Kim, **Y. B. Lee**, W. Song, S. Myung, S. S. Lee, J. Lim, K.-S. An. "Large-scale Growth and Simultaneous Doping of Molybdenum Disulfide Nanosheets." *Scientific Reports*, 6, 24054 (2016).
3. H. Lee, Y. Lee, C. Song, H. R. Cho, R. Ghaffari, T. K. Choi, K. H. Kim, **Y. B. Lee**, D. Ling, H. Lee, S. J. Yu, H. Choi, T. Hyeon, D.-H. Kim. "An Endoscope with Integrated Transparent Bioelectronics and Theragnostic Nanoparticles for Colon Cancer Treatment." *Nature Communications*, 6, 10059 (2015).
2. S. Choi, J. Park, W. Hyun, J. Kim, J. Kim, **Y. B. Lee**, C. Song, H. J. Hwang, J. H. Kim, T. Hyeon, D.-H. Kim. "Stretchable Heater Using Ligand-Exchanged Silver Nanowire Nanocomposite for Wearable Articular Thermotherapy." *ACS Nano*, 9, 6626 (2015).
1. S. Lim, D. Son, J. Kim, **Y. B. Lee**, J.-K. Song, S. Choi, D. J. Lee, J. H. Kim, M. Lee, T. Hyeon, D.-H. Kim. "Transparent and Stretchable Interactive Human Machine Interface Based on Patterned Graphene Heterostructures." *Advanced Functional Materials*, 25, 375 (2015).

Manuscripts in Preparation

- **Y. B. Lee**, M. Murphy, H.-G. Seong, M. Kim, C. M. Bates, C. J. Hawker. Research topic: Oxygen-tolerant photocurable polymer networks. (Manuscript completed; submission pending patent filing).
- **Y. B. Lee**, J. Ong, A. Perez, M. E. Helgeson, C. M. Bates, C. J. Hawker, A. A. Pitenis. Research topic: PFAS-free liquid-repellent polymer coatings. (Manuscript completed; submission pending patent filing).
- K. M. Chang, **Y. B. Lee**, L. E. Rodriguez Koett, F. J. Balta Bonner, B. A. Suslick, I. Chasiotis, N. R. Sottos. "Self-Passivating Thermosets for Active Erosion Resistance in Low Earth Orbit." (Manuscript in preparation).

Patents

1. Paul V. Braun, **Y. B. Lee**, Gerald O. Wilson. "Self-healing Polymers and Formulation for Preparing a Self-Healing Polymer." PCT/US2024/021718 (filed Mar. 27, 2024; WO 2024/206470 A2); U.S. Patent Application 18/619,062; EP 24781828.9; CN 202480023648.2; MX/a/2025/011489; CA 3,287,316; JP 2025-556582.
2. P. Krishnan, J. Lessard, N. R. Sottos, J. S. Moore, C. Saengow, J. C. Cooper, Y. S. Kim, **Y. B. Lee**, S. H. Tawfick, Z. Xu, S. Huang. "Rapid Gelation of Thermoset Resin for Three-dimensional Printing using Frontal Polymerization." U.S. Provisional Patent Applications 63/561,389 (filed Mar. 5, 2024) and 63/663,830 (filed Jun. 25, 2024); PCT/US2025/018287 (filed Mar. 4, 2025); U.S. National Stage Application 19/621,186 (filed Sept. 3, 2026).
3. S. S. Lee, K.-S. An, J. Lim, S. Myung, W. Song, **Y. B. Lee**. "Manufacturing Method of Expanded Graphite." Korea Patent (10-2028911-0000), granted Sept. 30, 2019.
4. S. S. Lee, K.-S. An, J. Lim, S. Myung, W. Song, **Y. B. Lee**, S. K. Ji, S. J. Lee. "Synthesis Method of Graphene Oxide." Korea Patent (10-1973663-0000), granted Apr. 23, 2019.
5. S. S. Lee, K.-S. An, J. Lim, S. Myung, W. Song, J. K. Han, **Y. B. Lee**. "Piezoelectric Material, Preparation Method Thereof and Flexible Nanogenerator Comprising the Same." Korea Patent (10-1826251-0000), granted Jan. 31, 2018.

Research Experience

University of California, Santa Barbara: Postdoctoral Researcher (Advisor: C. J. Hawker)

- Dow (industry-sponsored): Development of photocurable polymer materials with improved curing and surface properties.
- Mitsubishi Chemical Center for Advanced Materials (MC-CAM): Development of PFAS-free polymer coatings for liquid repellency and surface performance.
- Dynamic polyborosiloxane networks with tunable relaxation; exploratory development of functional polymers.

University of Illinois Urbana Champaign: Graduate Researcher (Advisor: P. V. Braun)

- ARPA-E REPAIR Program (ExiPiP™, multi-institution): Developed self-healing thermoset materials for autonomous rehabilitation of natural gas pipelines.
- Developed embedded 3D printing in chemically activating supporting media for soft polymers, hydrogels, and structural thermosets.
- Designed thermally stable micro- and nanocapsules for delivering catalysts, monomers, and ionic species under demanding processing conditions.
- Laboratory manager, Braun Group (2.5 years): shared wet-chemistry, darkroom, and laser facilities.

Korea Research Institute of Chemical Technology: Researcher

- Synthesized nanomaterials and two-dimensional materials and integrated them into electronic, electrochemical, and piezoelectric devices and sensors.

Seoul National University: Graduate Researcher

- Developed functional materials and device architectures for stretchable and wearable electronics, including transparent epidermal sensor systems for biomedical applications.

Teaching & Pedagogical Training

Certificate in Inclusive Teaching, University of California, Santa Barbara	2026
TA Development Program Workshops, University of California, Santa Barbara	Expected 2026
Teaching Assistant, Physical Chemistry II, Seoul National University	Fall 2014

Research Mentoring

Name	Year	Current Position / Affiliation
Julia Ong	2025 – Present	Ph.D. Student, Pitenis Group, UCSB
Andrea Perez	2025 – Present	Ph.D. Student, Helgeson Group, UCSB
Kate Roth	2025	M.S. Student, ETH Zürich
Derek de Jong	2020 – 2023	Ph.D. Student, Hart Group, MIT
Jaeyoung Kim	2020 – 2022	Ph.D. Student, Vlachos Group, University of Delaware
Yirang Lim	2016 – 2018	Samsung Electronics, South Korea

Conference Presentations

1. **Y. B. Lee.** “Adaptive Polymeric Materials for Sustainability, Surface Engineering, and Advanced Manufacturing.” *Meet the Faculty and Post-Doc Candidates Poster Session*, 2026 AIChE Annual Meeting, Minneapolis, MN, Nov. 2026. Accepted Poster Presentation.
2. **Y. B. Lee,** et al. “Supporting media cured 3D printing of poly(dicyclopentadiene).” *ACS Spring 2024*, New Orleans, LA, Mar. 2024. Oral Presentation.
3. **Y. B. Lee,** et al. “Self-healing polydicyclopentadiene prepared via frontal polymerization.” *ACS Spring 2023*, Indianapolis, IN, Mar. 2023. Oral Presentation.

Professional Service & Outreach

Peer Reviewer, <i>Journal of Polymer Science</i>	2025 – Present
Peer Reviewer, <i>Polymer Composites</i>	2026
Materials Science Outreach Volunteer, El Camino Elementary School, UCSB	2026
Self-Healing Materials Exhibit Lead, Beckman Institute Open House, UIUC	2023

Technical Expertise

Polymer Synthesis & Functionalization: ROMP, free-radical photopolymerization, controlled radical polymerization, PDMS and siloxane chemistry, interfacial polymerization, surface functionalization

Polymer Processing & Additive Manufacturing: Embedded 3D printing, direct ink writing, DLP photopolymerization, microencapsulation

Materials Characterization: Rheology, mechanical testing, NMR, GPC, DSC/TGA, XPS, Raman/FTIR spectroscopy, SEM, AFM, and surface characterization

Micro/Nanofabrication: Photolithography, thin-film deposition, wet/dry etching, soft lithography, CVD