

Sangtae Kim

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Employment

2024 March. - present	Associate Professor, Department of Nuclear Engineering <i>Hanyang University</i>	<i>Seoul, Korea</i>
2020 March. - 2024 Feb.	Assistant Professor, Department of Nuclear Engineering <i>Hanyang University</i>	<i>Seoul, Korea</i>
2018 Sept. - 2020 Feb.	Senior Research Scientist, Center for Electronic Materials <i>Korea Institute of Science and Technology</i>	<i>Seoul, Korea</i>
2016 July - 2018 Aug.	Researcher, Center for Electronic Materials <i>Korea Institute of Science and Technology</i>	<i>Seoul, Korea</i>

Education

2010 – 2016	Ph.D. in Materials Science and Engineering (Thesis Advisor: Prof. Ju Li) Minor in Computational Science <i>Massachusetts Institute of Technology</i> Thesis Title: Electrochemically Driven Mechanical Energy Harvesting	<i>Cambridge, MA</i>
2006 – 2010	(honors) B.S. in Materials Science and Engineering, emphasis in Materials Physics <i>University of California, Berkeley</i>	<i>Berkeley, CA</i>

Honors

2024 January	Young Scientist Award, Hanyang University – <i>Seoul, Korea</i>
2021 December	iCANX Young Scientist Award, iCANX Foundation – <i>Beijing, China</i>
2021 August	Best Teacher Award, <i>Hanyang University – Seoul, Korea</i>
2015 April	Best Poster Award, <i>Materials Research Society Spring Meeting 2015 – San Francisco, CA</i>
2014 September	Finalist, MADMEC Prototype Contest, Massachusetts Institute of Technology - Cambridge, MA Among the top 5 teams of 2014 MIT MADMEC competition with working prototype built to fundamentally enhance environmental and energy sustainability
2009 November	Graduate Fellowship, Samsung Scholarship Foundation - <i>Seoul, Korea</i> Selected as a full fellowship student (\$50,000/year for 5 years) towards M.S./Ph.D.
2009 April	Outstanding Undergraduate Student Award, Electronic Materials Symposium 2009 - <i>San Jose, CA</i>
2009 March	Elaine C. Shen Memorial Award, Materials Science and Engineering Department, University of California, Berkeley - <i>Berkeley, CA</i>

Publications ([†] denotes co-first authors, * denotes corresponding authors)

1. B.K. Jung, H. Yoo, B. Seo, H.J. Choi, Y.K. Choi, T.H. Kim, N. Oh, S.Y. Kim, **S. Kim**, Y. Lee, J.W. Shim, H.Y. Park*, G.W. Hwang*, T.N. Ng*, S.J. Oh* “High-Affinity-Ligand-Enhanced Passivation of III–V Colloidal Quantum Dot for Sensitive Near-Infrared Photodetection” *ACS Energy Letters* (in press)
2. D.J. Han[†], C. Kwon[†], K. Sasaki, **S. Kim***, E.S. Cho* “Tailoring Hierarchical Pore Structures in Carbon Scaffolds for Hydrogen Storage of Nanoconfined Magnesium” *Chemical Engineering Journal* 2024 **481** 148451
3. H. Kim[†], J.S. Kim[†], Y. Lee, S. Kim, Y. Lee, Y.-S. Kim, J.-H. Kang*, **S. Kim*** “Microstructure and mechanical properties of hydride blisters formed on Zircaloy-4 claddings” *Journal of Nuclear Materials* 2024 **588** 154777

4. S. Park, S. Seo, D. Shin, S. Chae, H. Cho, **S. Kim***, W. Choi* “Synthesis of carbon nanotube-iron oxide composites via combustion waves for hybrid Li-ion battery anodes” *Chemical Engineering Journal* 2023 **470** 144260
5. S. Hur†, **S. Kim†**, H.-S. Kim, A. Kumar, C. Kwon, J. Shin, H. Kang, T.H. Sung, J. Ryu*, J.M. Baik*, H.C. Song* “Low-grade waste heat recovery scenarios: Pyroelectric, thermomagnetic, and thermogalvanic thermal energy harvesting” *Nano Energy* 2023 **114** 108596
6. K. Bang†, C. Kwon†, H. Lee, **S. Kim***, E. Cho* “Horizontally Asymmetric Nanochannels of Graphene Oxide Membranes for Efficient Osmotic Energy Harvesting” *ACS Nano* 2023 **17** 11 10000–10009
7. D. Kang, J. Park, E. Choi, Y. Kwon, **S. Kim***, D. Lee* “Proportionality between Electrochemical Thermopower and Mass Fraction in PEDOT:PSS / AC Model Binary Supercapacitor Electrodes” *Materials Letters* 2023 **346** 134514
8. S. Shin†, N. Gwak†, H. Yoo†, H. Jang, M. Lee, K. Kang, S. Kim, S. Yeon, T.A. Kim, T. Park, **S. Kim***, G.W. Hwang*, N. Oh* “Fluoride-free Synthesis Strategy for Luminescent InP Cores and Effective Shelling Processes via Combinational Precursor Chemistry” *Chemical Engineering Journal* 2023 **466** 143223
9. B. Seo†, Y. Cha†, Y. Choi, **S. Kim***, W. Choi*, “Rationally designed micropixelation-free tactile sensors via contour profile of triboelectric field propagation” *Nano Energy* 2023 **109** 108255
10. H. Kim†, C. Kwon†, S. Ham, J. Lee, S.J. Kim*, **S. Kim*** “Physical properties of KCl-UCl₃ molten salts as potential fuels for molten salt reactors” *Journal of Nuclear Materials* 2023 **577** 154329
11. D.-G. Lee, J. Shin, H.S. Kim, S. Hur, S. Sun, J.-S. Jang, S. Chang, I. Jung, S. Nahm, H. Kang, C.-Y. Kang, **S. Kim**, J.M. Baik, I.-R. Yoo, K.-H. Cho*, H.-C. Song* “Autonomous Resonance-Tuning Mechanism for Environmental Adaptive Energy Harvesting” *Advanced Science* 2022 **10** 2205179
12. **S. Kim**, J. Choi, H.-M. Seong, I. Jung, K.H. Ryu, H.-C. Song, C.-Y. Kang*, M. Kim* “Gradient-index phononic crystal and Helmholtz resonator coupled structure for high-performance acoustic energy harvesting” *Nano Energy* 2022 **101** 107544
13. H. Yoo, K.-S. Lee, S. Nahm, G.W. Hwang*, **S. Kim*** “Predicting ligand-dependent nanocrystal shapes of InP quantum dots and their electronic structures” *Applied Surface Science* 2022 **15** 151972
14. Y.G. Song, J.M. Suh, J.Y. Park, J.E. Kim, S.Y. Chun, J.U. Kwon, H. Lee, H.W. Kang, **S. Kim**, C.-Y. Kang*, J.H. Yoon*, “Artificial Adaptive and Maladaptive Sensory Receptors Based on a Surface-Dominated Diffusive Memristor” *Advanced Science* 2022 **9** 4 2103484
15. J. Koh, E. Choi, K. Sasaki, **S. Kim***, E.S. Cho* “Uncovering the Encapsulation Effect of Reduced Graphene Oxide Sheets on Hydrogen Storage Properties of Palladium Nanocubes” *Nanoscale* 2021 **13** 16942-16951
16. D.J. Han, **S. Kim***, E.S. Cho*, “Revealing the Role of Defects in Graphene Oxide on Evolution of Magnesium Nanocrystals and the Resulting Effects on Hydrogen Storage” *Journal of Materials Chemistry A* 2021 **9** 9875-9881
17. B. Seo, Y. Cha, **S. Kim***, W. Choi* “Tunable Current Duration in Triboelectric Generators via Capacitive Air-Gaps” *International Journal of Energy Research* 2021 **45** 4
18. I.-H. Baek, A.-J. Cho, **S. Kim**, G.-Y. Lee, J.H. Han, T.-M. Chung, S.-H. Baek, C.-Y. Kang, J.-S. Kim, C.S. Hwang, S.K. Kim* “Substrate Surface Modification for Enlarging Two-Dimensional SnS Grains at Low Temperatures” *Chemistry of Materials* 2020 **32** 20
19. S.W. Paek*, S. Balasubramanian, **S. Kim**, O. de Weck “Small-Satellite Synthetic Aperture Radar for Continuous Global Biospheric Monitoring: A Review” *Remote Sensing* 2020 **12** 16
20. Y.-H. Shin, J. Choi, S.J. Kim, **S. Kim**, D. Maurya, T.-H. Sung, S. Priya, C.-Y. Kang, H.-C. Song* “Automatic Resonance Tuning Mechanism for Ultra-wide Bandwidth Mechanical Energy Harvesting” *Nano Energy* 2020 **77** 104986
21. I. Jung†, J. Choi†, H.-J. Park, T.-G. Lee, S. Nahm, H.-C. Song, **S. Kim***, C.-Y. Kang*, “Design Guidelines for Coupled Piezoelectric and Electromagnetic Hybrid Energy Harvesters for Autonomous Sensor Systems” *Nano Energy* 2020 **75** 104921
22. W. Lee, **S. Kim**, E. Larsen, H.-H. Choi, S.-H. Baek, M. Lee, D.-Y. Cho, H.-K. Lee, C.S. Hwang, C.

- Bielawski, S.K. Kim* “Atomic Engineering of Metastable BeO₆ Octahedra in a Rocksalt Framework” *Applied Surface Science* 2020 501 144280
23. B. Seo†, Y. Cha†, **S. Kim***, W. Choi*, “Rational Design for Optimizing Hybrid Thermo-Triboelectric Generators Targeting Human Activities” *ACS Energy Letters* 2019 4 2069-2074
 24. H.K. Seo, J.Y. Park, J.H. Chang, K.S. Dae, M.-S. Noh, S.-S. Kim, C.-Y. Kang, K. Zhao, **S. Kim***, J.M. Yuk*, “Strong Stress-Composition Coupling in Lithium Alloy Nanoparticles” *Nature Communications* 2019 10 3428
 25. M.-S. Noh, H. Lee, Y.G. Song, I. Jung, R. Ning, S.W. Paek, H.-C. Song, S.-H. Baek, C.-Y. Kang*, **S. Kim*** “Li Alloy-Based Non-Volatile Actuators” *Nano Energy* 2019 57 653-659
 26. Y.G. Song†, Y.-S. Shim†, J.M. Suh, M.-S. Noh, G.S. Kim, K.S. Choi, B. Jeong, **S. Kim**, H.W. Jang, B.-K. Ju, C.-Y. Kang* “Ionic-activated Chemiresistive Gas Sensors for Room-temperature Operation” *Small* 2019 15 1902065
 27. H. Lee, **S. Kim**, N.S. Parmar, J.-H. Song, K.-Y. Chung, K.-B. Kim, J.-W. Choi* “Carbon-free Mn-doped LiFePO₄ cathodes for highly transparent thin film batteries” *Journal of Power Sources* 2019 434 226713
 28. S.W. Paek*, **S. Kim**, O. de Weck “Optimization of Reconfigurable Satellite Constellations Using Simulated Annealing and Genetic Algorithm” *Sensors* 2019 19 765
 29. H.B. Xua†, J.H. Kim†, **S. Kim**, H.-J. Hwang, D. Maurya, D. Choi*, H.-C. Song*, C.-Y. Kang* “Double layered dielectric elastomer by vapor encapsulation casting for highly deformable and strongly adhesive triboelectric materials” *Nano Energy* 2019 62 144-153
 30. S.Y. Yi†, Y.G. Song†, J.Y. Park, J.M. Suh, G.S. Kim, Y.-S. Shim, J.M. Yuk, **S. Kim**, H.W. Jang, B.-K. Ju, C.-Y. Kang* “Morphological Evolution Induced through Heterojunction of W-decorated NiO Nanoigloos: Synergistic Effect on High-performance Gas Sensors” *ACS Applied Materials and Interfaces* 2019 11 7 7529-7538
 31. K. Liu†, E. Ko†, **S. Kim**, J. Park, C.S. Hwang, J.-H. Choi* “Orientation-dependent structural and electronic properties of Ge/a-GeO₂ interfaces: first-principles study” *Journal of Physics D* 2019 52 15
 32. Y.G. Song, J.Y. Park, J.M. Suh, Y.-S. Shim, S.Y. Yi, H.W. Jang, **S. Kim**, J.M. Yuk, B.-K. Ju*, C.-Y. Kang* “Heterojunctions based on Rh-decorated WO₃ Nanorods for Morphological Change and Gas Sensor Application using Transition Effect” *Chemistry of Materials* 2019 31 207-215
 33. Y.-S. Shim, K.C. Kwon, J.M. Suh, K.S. Choi, Y.G. Song, W. Sohn, S. Choi, K.T. Hong, J.-M. Jeon, S.-P. Kim, **S. Kim**, S.Y. Kim, C.-Y. Kang, H.W. Jang* “Synthesis of Numerous Edge Sites in MoS₂ via SiO₂ Nanorods Platform for Highly Sensitive Gas Sensor” *ACS Applied Materials and Interfaces* 2018 10 31594-31602
 34. **S. Kim***, H.J. Gwon, S.W. Paek, S.K. Kim, J.-W. Choi, J.-S. Kim, J.-H. Choi, C.-Y. Kang*, S.-H. Baek* “A novel class of oxynitrides stabilized by nitrogen dimer formation” *Scientific Reports* 2018 8 14471
 35. H. Hwang, K.Y. Lee, J.-H. Shin, **S. Kim***, W. Choi*, “Metal-free, Flexible Triboelectric Generator based on MWCNT mesh film and PDMS layers” *Applied Surface Science* 2018 442 693-699
 36. Y.-H. Shin†, I. Jung†, M.-S. Noh, J.H. Kim, J.-Y. Choi, **S. Kim***, C.-Y. Kang*, “Piezoelectric Polymer-based Roadway Energy Harvesting via Displacement Amplification Module” *Applied Energy* 2018 216 741-750
 37. Y.-H. Shin, I. Jung, H. Park, J.J. Pyeon, J.G. Son, C.M. Koo, **S. Kim***, C.-Y. Kang*, “Mechanical Fatigue Resistance of Piezoelectric PVDF polymers” *Micromachines* 2018 9 503
 38. H. Lee, **S. Kim**, K.-B. Kim, J.-W. Choi, “Scalable Fabrication of Flexible Thin Film Batteries for Smart Lens Applications” *Nano Energy* 2018 53 225-231
 39. Y.-S. Shim, B. Jang, J.M. Suh, M.S. Noh, **S. Kim**, D.H. Kim, C.-Y. Kang, H.W. Jang, W. Lee, “Nanogap-controlled Pd Coating for Hydrogen Sensitive Switches and Hydrogen Sensors” *Sensors and Actuators B* 2018 255 1841-1848
 40. W.C. Lee, C.J. Cho, **S. Kim**, E.S. Larsen, J.H. Yun, C.W. Bielawski, C.S. Hwang, S.K. Kim, “Growth and Characterization of BeO Thin Films Grown by Atomic Layer Deposition Using H₂O and O₃ as

Oxygen Sources” *Journal of Physical Chemistry C* 2017 **121** 17498-17504

41. M.-S. Noh, S. D. Han, S. Chae, S. H. Back, **S. Kim**, S.-H. Baek, S. K. Kim, J.-W. Choi, J.-S. Kim, D. J. Ahn, D. Choi, C.-Y. Kang, “Selective, Rapid, Wafer-scale, Room-Temperature Synthesis of Plasmonic Isotropic Nanospheres by Laser Irradiation on Metal Nanocolumnar Thin Films” *Journal of Materials Chemistry C* 2018 **6** 6038-6045
42. T.-H. Kil, S. Kim, D.-H. Jung, D.-M. Geum, S. Lee, S.-J. Jung, **S. Kim**, C. Park, J.-S. Kim, J.M. Baik, K.-S. Lee, C.Z. Kim, W.J. Choi, S.-H. Baek, “A Highly Efficient, Concentrating-Photovoltaic/Thermoelectric Hybrid Generator” *Nano Energy* 2017 **37** 242-247
43. M.-S. Noh, **S. Kim**, D.-K. Hwang, C.-Y. Kang, “Self-powered Flexible Touch Sensors based on PZT Thin Films using Laser Lift-off” *Sensors and Actuators A* 2017 **261** 288-294
44. Y.G. Song[†], Y.-S. Shim[†], **S. Kim**, S.D. Han, H.G. Moon, M.S. Noh, K. Lee, H.R. Lee, J.-S. Kim, B.-K. Ju, C.-Y. Kang, “Downsizing Gas Sensors based on Semiconducting Metal Oxides: Effects of Electrodes on Gas Sensing Properties” *Sensors and Actuators B* 2017 **248** 949-956 ([†] equal contribution)
45. S.D. Han, M.-S. Noh, **S. Kim**, Y.-S. Shim, Y.G. Song, K. Lee, H.R. Lee, S. Nahm, S.-J. Yoon, J.-S. Kim, C.-Y. Kang, “Versatile Approaches to Tune a Nanocolumnar Structure for Optimized Electrical Properties of In₂O₃ Based Gas Sensor” *Sensors and Actuators B* 2017 **248** 894-901
46. I. Jung, Y.-H. Shin, **S. Kim**, J. Choi, C.-Y. Kang, “Flexible Piezoelectric Polymer based Energy Harvesting System for Roadway Applications” *Applied Energy* 2017 **197** 222-229
47. K.P. So, D. Chen, A. Kushima, M. Li, **S. Kim**, Y. Yang, Z. Wang, J.G. Park, Y.H. Lee, R.I. Gonzalez, M. Kiwi, E.M. Bringa, S. Lin, J. Li, “Dispersion of Carbon Nanotubes in Aluminum Improves Radiation Resistance” *Nano Energy* 2016 **22** 319-327
48. **S. Kim**, S.J. Choi, K. Zhao, H. Yang, G. Gobbi, S. Zhang, J. Li*, “Electrochemically driven Mechanical Energy Harvesting” *Nature Communications* 2016 **7** 10146
49. Y. Zhang, C. Huang, **S. Kim**, M. Golkaram, M.W.A. Dixon, L. Tilley, J. Li, S. Zhang, S. Suresh, “Multiple Stiffening Effects of Nano-Scale Knobs on Human Red Blood Cells Infected with Plasmodium Falciparum Malaria Parasite” *Proceedings of National Academy of Sciences* 2015 **112** 19 6068-6073
50. **S. Kim**[†], X. Ma[†], S.P. Ong, G. Ceder*, “A Comparison of Destabilization Mechanisms of the Layered Na_xMO₂ and Li_xMO₂ Compounds upon Alkali De-Intercalation” *Physical Chemistry Chemical Physics*, 2012 **14** 15571-15578
51. S.P. Ong, V.L. Chevrier, G. Hautier, A. Jain, C. Moore, **S. Kim**, X. Ma, G. Ceder, “Voltage, Stability and Diffusion Barrier Differences between Sodium-Ion and Lithium-Ion Intercalation Materials” *Energy and Environmental Sciences*, 2011 **4** 3680-3688

Selected Invited Talks

1. **S. Kim** “Stress-Electrochemistry Coupling for Energy Applications” iCANX Talk Series, 2022
2. **S. Kim** “Energy Harvester Concepts Utilizing Stress-Composition Coupling in Li Alloys” 237th Electrochemical Society Meeting (ECS), Montreal, Canada 2020 (**cancelled due to COVID-19**)
3. **S. Kim** “Energy Harvester Concepts Utilizing Stress-Composition Coupling in Li Alloys” International Conference on Active Materials and Soft Mechatronics (AMSM), Incheon, Korea 2019
4. **S. Kim** “Stress-Composition Coupling in Li Alloys” International Workshop in Piezoelectric Materials and Applications in Actuators (IWPMA), Lyon, France 2019
5. **S. Kim** “Stress-Composition Coupling and its Applications in Energy Harvesting and Actuators” Nano Convergence Conference (NCC), Chuncheon, Korea 2019
6. **S. Kim** “Search for Nitrogen Dimer Stabilized Oxynitrides”, Nano Korea 2019, Ilsan, Korea 2019
7. **S. Kim** “Timescale Tunability in Mechanical Energy Harvesting and Potential Materials Development” International Workshop on Nanogenerators and Piezotronics (NGPT), Seoul, Korea 2018
8. **S. Kim** “Timescale Tunability in Mechanical Energy Harvesting” Materials Challenges in Alternative and Renewable Energy (MCARE), Jeju, Korea 2017

9. **S. Kim**, X. Ma, S.P. Ong, G. Ceder “Understanding the Difference in Intercalation Behavior between Layered Na- and Li- Transition Metal Oxides” ECS PRiME Hawaii 2012

Service

- 2024 Jan.
- 2024 Dec. Board member for International Affiliations, *The Korean Ceramic Society*
- 2023 Jan.
- 2023 Dec. Scientific Commissioner, *Korean Association for Radiation Protection*
- 2019 Nov.
- 2021 May Guest Editor, Special Issues for *Sensors* on Gas Sensors, 2021
- 2018 Sep.
- 2018 June Symposium Organizing Committee, *Nano Korea* 2019
- 2017 Sep.
- 2018 May Local Organizing Committee, *International Conference on Nanogenerators and Piezotronics (NGPT)* 2018
- 2013 Oct.
- 2014 Aug. EHS Safety Representative, *Ju Li group, Environmental Health and Safety, Massachusetts Institute of Technology, Cambridge, MA*
- Trained lab users on lab specific training on a regular basis and wrote the safety code of conduct as well as recommended lab practices for Ju Li group
 - Constructed and maintained the safety web page for Ju Li group, including list of chemicals, safety rules and crime scene casebook.