

## SUNG HOON KANG

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### EDUCATION

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- Harvard University** Cambridge, MA  
Ph.D., Applied Physics, School of Engineering and Applied Sciences May 2012  
Thesis: Self-Organization of Bioinspired Fibrous Surfaces  
Advisor: Prof. Joanna Aizenberg
- Massachusetts Institute of Technology** Cambridge, MA  
S.M., Materials Science and Engineering 2004  
Thesis: Evaporative Printing of Organic Materials & Metals and Development of Organic Memories  
Advisor: Prof. Vladimir Bulović
- Seoul National University** Seoul, Korea  
B.S., *summa cum laude*, Materials Science and Engineering 2000

### PROFESSIONAL EXPERIENCE

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- Johns Hopkins University** Baltimore, MD  
Assistant Professor, Dept. of Mechanical Engineering/Hopkins Extreme Materials Institute January 2015-present
- Harvard University** Cambridge, MA  
Postdoctoral Fellow (Advisor: Prof. Katia Bertoldi) June 2012-December 2014
- Harvard University** Cambridge, MA  
Doctoral Researcher (Advisor: Prof. Joanna Aizenberg) 2008-May 2012
- EIC Laboratories, Inc.** Norwood, MA  
Staff Scientist (Supervisor: Dr. Krishna C. Mandal) 2004-2007
- Massachusetts Institute of Technology** Cambridge, MA  
Graduate Research Assistant (Advisor: Prof. Vladimir Bulović) 2001-2004

### AWARDS AND HONORS

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- FY 2018 Air Force Office of Scientific Research Young Investigator Program Award 2017
- NSF Fellowship for Summer Institute on Additive Manufacturing (Evanston, IL) 2013
- Early Career Development Workshop Fellowship, Korean-American Scientists and Engineers Association 2013
- Poster Award, Growth and Form: Pattern Formation in Biology, Aspen Center for Physics 2012
- Graduate Student Award Gold Medal, Materials Research Society Fall Meeting 2011
- Second Place Poster Award 2011
- NSF Workshop and Freund Symposium on Future Directions of Mechanics Research (Providence, RI)

## **STUDENT AWARDS AND HONORS**

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Khalid Elawad (undergraduate researcher) : American Society of Cell Biology MAC Travel Award and 2 <sup>nd</sup> place poster award	2017
Tara Foley (undergraduate advisee) : Fall 2017 Dean's List	2017
Mohid Khan (undergraduate advisee) : Fall 2017 Dean's List	2017
Franz O'Mealley (undergraduate advisee) : Fall 2017 Dean's List	2017

## **PUBLICATIONS (33 papers, 2426 citations, h-index=20 from Google Scholar)**

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(bold: graduate student or post-doc in my lab; *italics*: undergraduate in my lab; \*: corresponding author)

[*after starting independent career*]

33. **L. Fang, J. Li, Z. Zhu, S. Orrego, S. H. Kang\***, “Piezoelectric polymer thin films with architected cuts,” **Journal of Materials Research**, 33, 330-342 (2018).
32. **J. Li, Z. Zhu, L. Fang, S. Guo, U. Erturun, Z. Zhu, J. E. West, S. Ghosh, S. H. Kang\***, “Analytical, Numerical, and Experimental Studies of Viscoelastic Effects of Soft Piezoelectric Nanocomposites,” **Nanoscale**, 9, 14215-14228 (2017).
31. N. Wadhwa, J. G. Chen, J. B. Sellon, D. Wei, M. Rubinstein, R. Ghaffari, D. M. Freeman, O. Buyukozturk, P. Wang, S. Sun, **S. H. Kang**, K. Bertoldi, F. Durand, and W. T. Freeman, “Motion microscopy for visualizing and quantifying small motions,” **Proceedings of the National Academy of Sciences**, 114, 11639–11644 (2017).
30. **S. Chen, J. Li, L. Fang, Z. Zhu, and S. H. Kang\***, “Simple Triple-State Polymer Actuators with Controllable Folding Characteristics,” **Applied Physics Letters**, 110, 133506 (2017).
29. **S. Orrego**, K. Shoele, A. Ruas, K. Doran, *B. Caggiano*, R. Mittal\*, and **S. H. Kang\***, “Harvesting Ambient Wind Energy with an Inverted Piezoelectric Flag,” **Applied Energy**, 194, 212-222 (2017).
28. P. Wang, Y. Zheng, M. C. Fernandes, Y. Sun, K. Xu, S. Sun, **S. H. Kang**, V. Tournat, and K. Bertoldi, “Harnessing Geometric Frustration to Form Band Gaps in Acoustic Networks,” **Physical Review Letters**, 118, 084302 (2017).
27. Y. Zarate, S. Babae, **S. H. Kang**, I. V. Shadrivov, D. N. Neshev, K. Bertoldi, David A. Powell, “Elastic Metamaterials for Tuning Circular Polarization of Electromagnetic Waves,” **Scientific Reports**, 6, 28273 (2016).
26. J. Liu, T. Gu, S. Shan, **S. H. Kang**, J. C. Weaver, and K. Bertoldi, “Harnessing Buckling to Design Architected Materials That Exhibit Effective Negative Swelling,” **Advanced Materials**, 28, 6619-6624 (2016).
25. **S. H. Kang\*** and Michel Dickey\*, “Patterning via self-organization and self-folding: beyond conventional lithography,” **Materials Research Society Bulletin**, 41, 93-96 (2016). (*guest editor of the theme issue, invited review*)

24. S. Shan†, S. H. Kang†, J. R. Raney†, P. Wang, L. Fang, F. Candido, J. Lewis, and K. Bertoldi, “Multistable Architected Materials for Trapping Elastic Strain Energy,” **Advanced Materials**, 27, 4296-4301 (2015). (†: equal contribution)

23. S. Shan, S. H. Kang, Z. Zhao, L. Fang, and K. Bertoldi, “Design of Planar Isotropic Negative Poisson’s Ratio Structures,” **Extreme Mechanics Letters**, 4, 96-102 (2015).

22. P. Wang, F. Casadei, S. H. Kang, and K. Bertoldi, “Locally Resonant Band Gaps in Periodic Beam Lattices by Tuning Connectivity,” **Physical Review B**, 91, 020103(R) (2015). (Rapid Communications)

[before starting independent career]

21. S. H. Kang, S. Shan, A. Kosmrlj, W. L. Noorduyn, S. Shian, J. C. Weaver, D. R. Clarke, and K. Bertoldi, “Complex Ordered Patterns in Mechanical Instability Induced Geometrically Frustrated Triangular Cellular Structures,” **Physical Review Letters**, 112, 09870 (2014). - Selected as *Physical Review Letters Editors’ Suggestion and Highlighted in Physics Synopsis*.

20. S. Shan, S. H. Kang, P. Wang, C. Qu, S. Shian, E. R. Chen, J. C. Weaver, and K. Bertoldi, “Harnessing Multiple Folding Mechanisms in Soft Periodic and Porous Structures to Design Highly Tunable Phononic Crystals,” **Advanced Functional Materials**, 24, 4935 (2014).

19. J. Shim, S. Shan, A. Kosmrlj, S. H. Kang, E. R. Chen, J. C. Weaver, and K. Bertoldi, “Harnessing Instabilities for Design of Soft Reconfigurable Auxetic/Chiral Materials,” **Soft Matter**, 9, 8198-8202 (2013). - *Highlighted on the Soft Matter blog*.

18. S. H. Kang†, S. Shan†, W. Noorduyn†, M. Khan, J. Aizenberg, and K. Bertoldi, “Buckling-Induced Reversible Symmetry Breaking and Chiral Amplification Using Supported Cellular Structures,” **Advanced Materials**, 25, 3380-3385 (2013). (†: equal contribution) - *Highlighted in the June 2013 issue of Nature Physics*.

17. A. Grinthal, S. H. Kang, A. K. Epstein, M. Aizenberg, M. Khan, and J. Aizenberg, “Steering Nanofibers: An Integrative Approach to Bio-Inspired Fiber Fabrication and Assembly,” **Nano Today**, 7, 35-52 (2012). (*invited review*)

16. S. H. Kang, N. Wu, A. Grinthal, and J. Aizenberg, “Meniscus Lithography: Evaporation-Induced Self-Organization of Pillar Arrays into Moiré Patterns,” **Physical Review Letters**, 107, 177802 (2011). - *Selected as Physical Review Letters Editors’ Suggestion and Highlighted in Physics Today and Physics Synopsis*.

15. T.-S. Wong, S. H. Kang, S. K. Y. Tang, E. J. Smythe, B. D. Hatton, A. Grinthal, and J. Aizenberg, “Bioinspired Self-Repairing Slippery Surfaces with Pressure-Stable Omniphobicity,” **Nature**, 477, 443-447 (2011). - *Featured on News & Views, highlighted in the issue and various media worldwide including BBC, the Times, Daily Mail, ABC (Australia & Spain), Discovery, Financial Times, Yahoo News (UK), Agence France-Presse, Sina (China), the Statesman (India), Nature Chemistry, Hot Topic Article in Nature Asia-Pacific, C&EN, AAAS EurekAlert, Chemistry World, Physics World, Spektrum Der Wissenschaft, New Scientist, and the Engineer*.

14. A. Seminara, B. Pokroy, S. H. Kang, M. P. Brenner, and J. Aizenberg, “On the Mechanism of Nanostructure Movement under Electron Beam and Its Application in Patterning,” **Physical Review B**, 83, 235438 (2011).

13. D. J. Lipomi, R. V. Martinez, M. A. Kats, S. H. Kang, P. Kim, J. Aizenberg, F. Capasso, and G. M. Whitesides, “Patterning the Tips of Optical Fibers with Metallic Nanostructures Using Nanoskiving,” **Nano Letters**, 11, 632-636 (2011).

12. S. H. Kang, B. Pokroy, L. Mahadevan, and J. Aizenberg, "Control of Shape and Size of Nanopillar Assembly by Adhesion-Mediated Elastocapillary Interaction," **ACS Nano**, 11, 6323-6331 (2010). - *Featured on the cover and highlighted in the issue.*
11. B. Pokroy, B. Aichmayer, A. S. Schenk, B. Haimov, S. H. Kang, P. Fratzl, and J. Aizenberg, "Sonication-Assisted Synthesis of Large, High-Quality Mercury-Thiolate Single Crystals Directly from Liquid Mercury," **Journal of the American Chemical Society**, 132, 14355-14357 (2010). - *Highlighted on C&EN.*
10. D. J. Lipomi, M. A. Kats, P. Kim, S. H. Kang, J. Aizenberg, F. Capasso, and G. M. Whitesides, "Fabrication and Replication of Arrays of Single- or Multi-Component Nanostructures by Replica Molding and Mechanical Sectioning," **ACS Nano**, 4, 4017-4026 (2010). - *Featured on the cover and highlighted in the issue.*
9. B. Pokroy, S. H. Kang, L. Mahadevan, and J. Aizenberg, "Self-Organization of a Mesoscale Bristle into Ordered, Hierarchical Helical Assemblies," **Science**, 323, 237-240 (2009). - *Highlighted in the issue, and various media including New York Times, NPR, Discovery, AAAS EurekAlert, C&EN, Technology Review, IEEE Spectrum, Science Daily, and New Scientist.*
8. K. C. Mandal, S. H. Kang, M. Choi, J. Chen, X.-C. Zhang, J. M. Schleicher, C. A. Schmuttenmaer, and N. C. Fernelius, "III-VI Chalcogenide Semiconductor Crystals for Broadband Tunable THz Sources and Sensors," **IEEE Journal of Selected Topics in Quantum Electronics**, 14, 284-288 (2008).
7. K. C. Mandal, S. H. Kang, M. Choi, R. David Rauh, "Rare-Earth Doped Potassium Lead Bromide Mid-IR Laser Sources for Standoff Detection," **International Journal of High Speed Electronics and Systems**, 18, 735 (2008).
6. K. C. Mandal, S. H. Kang, M. Choi, A. Kargar, M. J. Harrison, D. S. McGregor, A. E. Bolotnikov, G. A. Carini, G. C. Camarda, and R. B. James, "Characterization of Low-Defect Cd<sub>0.9</sub>Zn<sub>0.1</sub>Te and CdTe Crystals for High-Performance Frisch Collar Detectors," **IEEE Transactions on Nuclear Science**, 54, 802-806 (2007).
5. K. C. Mandal, S. H. Kang et al, "Component Overpressure Growth and Characterization of High Resistivity CdTe Crystals for Radiation Detectors," **Journal of Electronic Materials**, 36, 1013-1020 (2007).
4. J. Chen, V. Leblanc, S. H. Kang, P. J. Benning, D. Shut, M. A. Baldo, M. A. Schmidt, and V. Bulović, "High Definition Digital Fabrication of Active Organic Devices by Molecular Jet Printing," **Advanced Functional Materials**, 17, 2722-2727 (2007).
3. V. Leblanc, J. Chen, S. H. Kang, V. Bulović, and M. A. Schmidt, "Micromachined Printheads for the Evaporative Patterning of Organic Materials and Metals," **Journal of Microelectromechanical Systems**, 16, 394-400 (2007).
2. K. C. Mandal, S. H. Kang et al, "Simulation, Modeling, and Crystal Growth of Cd<sub>0.9</sub>Zn<sub>0.1</sub>Te for Nuclear Spectrometers," **Journal of Electronic Materials**, 35, 1251-1256 (2006).
1. S. H. Kang, T. Crisp, I. Kyymissis, and V. Bulović, "Memory Effect from Charge Trapping in Layered Organic Structures," **Applied Physics Letters**, 85, 4666-4668 (2004).

## **INVITED PRESENTATIONS (34 invited talks)**

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S. H. Kang, "Shape-changing cardiovascular implants for accommodating the growth of children," Department of Mechanical and Materials Engineering, Duke University, Durham, NC, October 2018.

S. H. Kang, “Synthesis of polymeric composites for ultrasensitive low-cost sensors and bone-inspired materials with self-adaptable mechanical properties and self-healing,” Department Chemical and Biomolecular Engineering, North Carolina State University, Raleigh, NC, October 2018.

S. H. Kang, “Ultrasensitive Low-Cost Nanoporous Composites with a Wide Pressure Sensing Range for Tactile Sensors,” International Union of Materials Research, Daejeon, Korea, August 2018.

S. H. Kang, “Bioinspired materials with self-adaptable mechanical properties and self-regeneration,” 5<sup>th</sup> Young Scientist Workshop, Department of Materials Science and Engineering, Seoul National University, Seoul, Korea, February 2018.

S. H. Kang, “Synthesis of polymeric composites for ultrasensitive low-cost sensors and bone-inspired materials with self-adaptable mechanical properties and self-healing,” School of Chemical Engineering, Sungkyunkwan University, Suwon, Korea, November 2017.

S. H. Kang, “Harnessing behaviors of piezoelectric polymer composites for enhancing charge generation and bone-inspired materials with self-adaptable mechanical properties and self-healing,” Department of Materials Science and Engineering, Seoul National University, Seoul, Korea, November 2017.

S. H. Kang, “Synthesis of polymer composites for ultrasensitive low-cost sensors and bone-inspired materials with self-regulating mechanical properties,” Department of Materials Science and Engineering, Korea Advanced Institute of Science and Technology, Daejeon, Korea, November 2017.

S. H. Kang, “Ultrasensitive low-cost tactile sensors and bioinspired mineralized scaffolds with self-adaptable mechanical properties and self-regeneration,” Department of Bio and Brain Engineering, Korea Advanced Institute of Science and Technology, Daejeon, Korea, November 2017.

S. H. Kang, “Harnessing behaviors of polymer composites for ultrasensitive low-cost sensors and bone-inspired materials with self-regulating mechanical properties,” Department of Materials Science and Engineering, Pohang University of Science and Technology, Pohang, Korea, November 2017.

S. H. Kang, “Architected materials for tunable elastic wave propagation and reversible energy absorption,” Korea Institute of Science and Technology, Seoul, Korea, November 2017.

S. H. Kang, “Harnessing behaviors of piezoelectric polymer composites for enhancing charge generation and bone-inspired materials with self-adaptable mechanical properties and self-healing,” College of Engineering and Applied Science, University of Colorado-Denver, Denver, CO, October 2017

S. H. Kang, “Design, Fabrication, and Characterization of Architected Materials for Energy Absorption and Vibration Propagation Control,” Department of Mechanical Engineering, University of Maryland, Baltimore County, Baltimore, MD, December 2016.

S. H. Kang, “The Future of Vibration Energy Transfer in Solids and Structures: Needs and Opportunities,” **Army Research Office Invited Workshop** on the Future of Vibration Energy Transfer in Solids and Structures: Needs and Opportunities, Seattle, WA, October 2016.

S. H. Kang, “Design, Fabrication, and Characterization of Architected Materials for Energy Absorption and Vibration Propagation Control,” Department of Mechanical and Manufacturing Engineering, University of Calgary, Calgary, AB, Canada, October 2016.

S. H. Kang, “Steering Behaviors of 3D Printed Materials and Structures,” The United States Army Research Laboratory, Aberdeen, MD, August 2016.

S. H. Kang, “Design, Fabrication, and Characterization of Architected Materials for Energy Absorption and Tunable Vibration Propagation,” Under Armour, Baltimore, MD, July 2016.

S. H. Kang, “Design, Fabrication, and Characterization of Architected Materials for Tunable Wave Propagation and Shape-Recoverable Energy-Absorption,” Department of Mechanical and Materials Engineering, Portland State University, Portland, OR, May 2016.

S. H. Kang, “Architected Materials for Tunable Elastic Wave Propagation and Reversible Energy Absorption,” Department of Mechanical Engineering, Stony Brook University, Stony Brook, NY, May 2016.

S. H. Kang, “Steering Interactions between Bioinspired Polymeric Fibrous Structures and Fluids,” National Institute of Standards and Technology, Gaithersburg, MD, June 2015.

S. H. Kang, “3D Technologies and Their Applications for Architected Materials,” Greater Baltimore Committee Education and Workforce, Baltimore, MD, May 2015.

S. H. Kang, “Steering Evaporation-Induced Self-Assembly of Nanopost Arrays by Interplay between Mechanics and Surface Chemistry,” Foundations of Nanoscience, Snowbird, UT, April 2015.

S. H. Kang, S. Shan, J. R. Raney, P. Wang, J. Lewis, and K. Bertoldi, “Design, Fabrication and Characterization of Architected Materials for Tunable Wave Propagation and Shape-Recoverable Energy-Absorption,” 2015 Mach Conference, Annapolis, MD, April 2015. **(keynote presentation of a session)**

S. H. Kang, “Harnessing Soft Materials for Functionality through Deformation and Instability,” 4th EITA Young Investigator Conference, Cambridge, MA, August 2015.

S. H. Kang, “Harnessing Deformation and Instability of Soft Structured Materials for Tunable Structures and Devices,” Department of Aeronautics and Astronautics, University of Washington, Seattle, WA, February 2015.

S. H. Kang and K. Bertoldi, “Soft Structured Materials: Functionality through Deformation and Instability,” Materials Research Society Meeting, San Francisco, CA, April 2014.

S. H. Kang, “Steering Structured Surfaces: Harnessing Geometry, Mechanical and Surface Properties to Form Complex Functional Patterns by Self-Organization,” Department of Mechanical and Industrial Engineering, University of Illinois, Chicago, IL, April 2014.

S. H. Kang, “Steering Structured Surfaces: Harnessing Geometry, Mechanical and Surface Properties to Form Complex Functional Patterns by Self-Organization,” Department of Mechanical Engineering, Virginia Polytechnic Institute and State University, Blacksburg, VA, April 2014.

S. H. Kang, “Steering Materials and Structures Under Extreme Conditions: Harnessing Geometry, Mechanical and Surface Properties to Form Complex Functional Patterns by Self-Organization,” Department of Mechanical Engineering, Johns Hopkins University, Baltimore, MD, March 2014.

S. H. Kang, “Steering Structured Surfaces: Harnessing Geometry, Mechanical and Surface Properties to Form Complex Functional Patterns by Self-Organization,” Department of Mechanical Engineering, University of Connecticut, Storrs, CT, February 2014.

S. H. Kang, “Self-Organization of Bioinspired Structured Surfaces by Interaction with Liquid,” Seoul National University, Seoul, Korea, July 2013.

S. H. Kang, “Harnessing Pattern Formation by Interaction between Liquid and Bioinspired Structured Surfaces,” Korea Institute of Science and Technology, Seoul, Korea, July 2013.

S. H. Kang, B. Pokroy, L. Mahadevan, and J. Aizenberg, “Evaporation-Induced Self-Organization of Polymer Nanorod Arrays: When Structured Solids Met a Liquid,” Society of Engineering Science 49<sup>th</sup> Annual Technical Meeting, Atlanta, GA, October 2012.

S. H. Kang and J. Aizenberg, “Steering Nanostructures: Controlling Self-Assembly of Bio-inspired Nanofibers,” American Chemical Society Spring Meeting, San Diego, CA, March 2012.

S. H. Kang, B. Pokroy, L. Mahadevan, and J. Aizenberg, “Shape and Size Control of Polymer Nanopost Assembly by Adhesion-Mediated Elastocapillary Interaction: Interplay between Mechanics and Surface Science,” Gordon-Kenan Research Seminar (Adhesion), Lewinston, ME, July 2011.

## **CONTRIBUTED PRESENTATIONS (32 contributed talks)**

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J. Li, Z. Zhu, L. Fang, S. Guo, U. Erturun, Z. Zhu, J. E. West, S. Ghosh, and S. H. Kang, “Analytical, numerical, and experimental studies of viscoelastic effects on the performance of soft piezoelectric nanocomposites,” 18th U.S. National Congress for Theoretical and Applied Mechanics, Chicago, IL, June 2018.

S. Orrego, U. Krekora, E. Kang, and S. H. Kang, “Bioinspired materials with self-adaptable mechanical properties and self-regeneration,” 2018 American Physical Society March Meeting, Los Angeles, CA, March 2018.

S. Orrego, U. Krekora, E. Kang, and S. H. Kang, “Bioinspired materials with self-adaptable mechanical properties and self-regeneration,” 7th International Conference on Mechanics of Biomaterials and Tissues, Waikoloa, HI, December 2017.

J. Li, Z. Zhu, L. Fang, S. Guo, U. Erturun, Z. Zhu, J. E. West, S. Ghosh, and S. H. Kang, “Viscoelastic Effects on the Performance of Soft Piezoelectric Nanocomposites,” ASME 2017 International Mechanical Engineering Congress, Tampa, FL, November 2017.

S. H. Kang, “A Bidirectional Self-Folding Actuator Based on Bilayer Shape Memory Polymers and Its Application to a Self-Folding Transformer,” ASME 2016 International Mechanical Engineering Congress, Phoenix, AZ, November 2016.

S. H. Kang, “Harnessing Deformation of Soft Materials for Multifunctionality,” Gordon Research Conference (Multifunctional Materials and Structures), Ventura, CA, February 2016.

S. H. Kang, S. Shan, J. R. Raney, P. Wang, J. Lewis, and K. Bertoldi, “Architected Materials for Reversible Trapping of Elastic Strain Energy,” Materials Research Society Fall Meeting, Boston, MA, December 2015.

S. H. Kang, S. Shan, J. R. Raney, P. Wang, J. Lewis, and K. Bertoldi, “Design and Fabrication of Shape-Recoverable Energy-Absorbing Structures by Numerical Modeling and 3D Printing,” ASME 2015 International Mechanical Engineering Congress, Houston, TX, November 2015.

S. H. Kang, S. Shan, J. R. Raney, P. Wang, F. Candido, J. Lewis, and K. Bertoldi, “Harnessing Snapthrough Instability for Shape-Recoverable Energy-Absorbing Structure,” American Physical Society March Meeting, San Antonio, TX, March 2015.

S. H. Kang, S. Shan, F. Candido, and K. Bertoldi, “Shape Programmable Metamaterials,” Materials Research Society Meeting, San Francisco, CA, April 2014.

S. H. Kang, S. Shan, A. Kosmrlj, and K. Bertoldi, “Formation of Complex Ordered Patterns in Buckling Induced Geometrically Frustrated Triangular Cellular Structures,” Materials Research Society Meeting, San Francisco, CA, April 2014.

S. H. Kang, S. Shan, A. Kosmrlj, W. Noorduyn, S. Shian, D. R. Clarke, and K. Bertoldi, “Complex Ordered Patterns in Mechanical Instability Induced Geometrically Frustrated Triangular Cellular Structures,” American Physical Society March Meeting, Denver, CO, March 2014.

S. H. Kang, S. Shan, and K. Bertoldi, “Experiments, Modeling, and Analysis of Geometrically Frustrated Cellular Structures,” Materials Research Society Meeting, Boston, MA, December 2013.

S. H. Kang, S. Shan, A. Kosmrlj, and K. Bertoldi, “Formation of Three Ordered Patterns by Two-Step Bifurcation of Geometrically Frustrated Cellular Structures,” ASME 2013 International Mechanical Engineering Congress, San Diego, CA, November 2013.

S. H. Kang and J. Aizenberg, “Self-Organization of Polymer Nanofiber Arrays for Bioinspired Multifunctional Systems,” ASME 2013 International Mechanical Engineering Congress, San Diego, CA, November 2013.

S. H. Kang, S. Shan, A. Kosmrlj and K. Bertoldi, “Complex Patterns with Tunability by Coupling Mechanical Instability with Geometrical Frustration,” New England Workshop on the Mechanics of Materials and Structures, Boston, MA, October 2013.

S. H. Kang, S. Shan, and K. Bertoldi, “Formation of Complex Ordered Patterns by Harnessing Mechanical Instability in Geometrically Frustrated Lattices,” Society of Engineering Science 50<sup>th</sup> Annual Technical Meeting, Providence, RI, July 2013.

S. H. Kang, S. Shan, and K. Bertoldi, “Coupling Geometrical Frustration with Mechanical Instabilities to Design Surfaces with Three Dynamically Changing States,” American Physical Society March Meeting, Baltimore, MD, March 2013.

S. H. Kang, S. Shan, W. Noorduyn, M. Khan, K. Bertoldi, and J. Aizenberg, “Chiral Pattern Formation in Polymer-Based Supported Cellular Structures by Elastic Instability,” Materials Research Society Meeting, Boston, MA, November 2012.

S. H. Kang, N. Wu, A. Grinthal, and J. Aizenberg, “Capillary-Induced Self-Organization of Soft Pillar Arrays into Moiré Patterns by Dynamic Feedback Process,” American Physical Society March Meeting, Boston, MA, March 2012.

S. H. Kang, L. Mahadevan, and J. Aizenberg, “Pattern Formation by Self-Organization of Biologically-Inspired Fibrous Surfaces,” Growth and Form: Pattern Formation in Biology, Aspen, CO, January 2012.

S. H. Kang, S. Shan, W. Noorduyn, M. Khan, K. Bertoldi, and J. Aizenberg, “Instability-Induced Chiral Structure Formation in Surface-Attached Honeycombs,” Materials Research Society Meeting, Boston, MA, November 2011.

S. H. Kang, S. Shan, W. Noorduyn, M. Khan, K. Bertoldi, and J. Aizenberg, “Buckling-Induced Chiral Pattern Formation in Rationally Designed Surface-Attached Honeycombs,” New England Workshop on the Mechanics of Materials and Structures, Cambridge, MA, October 2011.

T.-S. Wong, S. H. Kang, S.K.Y. Tang, and J. Aizenberg, “Robust Slippery Surfaces as Optically Transparent, Oleophobic, and Anti-icing Materials,” 14th Nano Science and Technology Institute (NSTI) Nanotech Conference and Expo, Boston, MA, June 2011.

S. H. Kang, B. Pokroy, L. Mahadevan, and J. Aizenberg, “Self-Assembly of Nanofibers with Controlled Hierarchy and Shape by Adhesion Mediated Elastocapillary Interaction,” NSF Workshop and Freund Symposium on Frontiers of Mechanics Research, Providence, RI, June 2011.



S. H. Kang, N. Wu, L. Mahadevan, and J. Aizenberg, “Meniscus Lithography: Using Moiré Effect for Controlling Self-Assembly by Evaporation,” New England Complex Fluid Meeting, New Haven, CT, March 2011.

S. H. Kang, N. Wu, and J. Aizenberg, “Controlling Hierarchical Self-Assembly of Polymer Bristles by Manipulating Meniscus Movement,” Materials Research Society Meeting, Boston, MA, November 2010.

S. H. Kang, B. Pokroy, L. Mahadevan, and J. Aizenberg, “Dynamic Wetting of Soft Fibrous Surface,” Faraday Discussion 146 - Wetting, Richmond, VA, April 2010.

S. H. Kang, N. Wu, L. Mahadevan, and J. Aizenberg, “Fine Tuning of Pattern Formation in Evaporation-Induced Self-Assembly of Polymer Bristles,” Materials Research Society Meeting, San Francisco, CA, April 2010.

S. H. Kang, B. Pokroy, L. Mahadevan, and J. Aizenberg, “Controlled Assembly of Biologically Inspired Arrays of Polymeric Fibers: Potential Applications,” Materials Research Society Meeting, Boston, MA, November 2009.

S. H. Kang, N. Wu, and J. Aizenberg, “Effects of Meniscus Formation and Movement on Self-Assembly of Polymer Post Arrays,” Kavli Institute, Cambridge, MA, November 2009.

S. H. Kang, B. Pokroy, L. Mahadevan, and J. Aizenberg, “Capillary Induced Chiral Self-Organization of High Aspect Ratio Polymeric Nanoposts: Investigating the Effects of Geometry and Elasticity,” Gordon Research Conference (Soft Condensed Matter Physics), New London, NH, August 2009.

## **PATENTS**

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“Biomimetic Self-Adaptable Systems,” S. H. Kang, S. Orrego, U.S. Provisional Patent Application No. 62/555,983, filed in September 2017.

“Tunable Thin-Film Acoustic Sensor, Manufacturing Methods, and Processing Algorithms,” I. McLane, J. E. West, D. Emmanoulidou, M. Elhilali, V. Rennoll, U. Erturun, S. Orrego, S. H. Kang, disclosed in June 2017.

“Slippery Surfaces with High Pressure Stability, Optical Transparency, and Self-Healing Characteristics,” J. Aizenberg, S. H. Kang, S. K. Y. Tang, T. S. Wong, U.S. Patent No. 9,121,306 and 9,121,307.

“Shape Recoverable and Reusable Energy Absorbing Structures, Systems and Methods for Manufacture Thereof,” S. H. Kang, K. Bertoldi, J. R. Raney, J. A. Lewis, S. Sicong, U.S. Provisional Patent Application No. PCT/US2015/27385, filed in April 2015.

“Anti-Counterfeiting Methods,” J. Aizenberg, X. He, S. H. Kang, T. S. Wong, U.S. Provisional Patent Application No. PCT/US2013/043627, filed in May 2013.

## **STUDENT MENTORING AND ADVISING**

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**Johns Hopkins University**

Baltimore, MD

### **[Postdoctoral Fellow]**

Dr. Santiago Orrego, Department of Mechanical Engineering  
Dr. Galip Ozan Erol, Department of Mechanical Engineering  
Dr. Seung-Yeol Jeon, Department of Mechanical Engineering

May 2015-Present  
June 2017-Present  
October 2017-Present

### **[Ph.D. Students]**

Lichen Fang, Department of Mechanical Engineering  
Zhezhi Chen, Department of Mechanical Engineering

Fall 2015-Present  
Fall 2017-Present

### [Master Students]

Zeyu Zhu, Department of Mechanical Engineering	Fall 2017-Present
Junjie Pan, Department of Mechanical Engineering	Fall 2017-Present
Decheng Hu, Department of Mechanical Engineering	Fall 2017-Present
Shichen Xu, Department of Mechanical Engineering	Fall 2017-Present
Boliang Wu, Department of Mechanical Engineering	Fall 2017-Present
Yishu Yan, Department of Mechanical Engineering	Fall 2017-Present
Emilio Bachtiar, Department of Mechanical Engineering	Fall 2016-Present
Azra Horowitz, Department of Biomedical Engineering	Fall 2016-Spring 2018
Mohit Singhala, Center for Bioengineering Innovation and Design	Fall 2016-Spring 2017
- <i>Currently PhD student at Johns Hopkins University</i>	
Yitao Chen, Department of Mechanical Engineering	Fall 2015-Spring 2017
- <i>Currently PhD student at Missouri University of Science and Technology</i>	
Shuyang Chen, Department of Mechanical Engineering	January 2015-May 2016
Thesis: Self-Folding Transformer Robot Based on Bidirectional Shape Memory Polymer Composite Actuators	
- <i>Currently PhD student at Rensselaer Polytechnic Institute</i>	
Rui (Olivia) Wang, Department Materials Science and Engineering	Spring 2015-Summer 2015
- <i>Currently Engineer at IBM</i>	

### [Undergraduate Students]

Urszula Krekora, Department of Chemical and Biomolecular Engineering	Spring 2016-Present
Khalid Elawad, Department of Materials Science and Engineering	Fall 2016-Present
Anna Burkholder, Department of Mechanical Engineering	Fall 2017-Present
Tara Foley, Department of Mechanical Engineering	Fall 2017-Present
Mohid Khan, Department of Mechanical Engineering	Fall 2017-Present
Franz O'Mealley, Department of Mechanical Engineering	Fall 2017-Present
Stephen Schmidt, Department of Mechanical Engineering	Fall 2017-Present
Rachel Swanstrom, Department of Mechanical Engineering	Fall 2017-Present
Gabriel Yuen, Department of Mechanical Engineering	Fall 2017-Present
Rebecca Grusby, Department of Chemical and Biomolecular Engineering	Spring 2018-Present
Daniel Wang, Department of Mechanical Engineering	Spring 2018-Present
Darius Irani, Department of Mechanical Engineering	Spring 2017
Eugene Kang, Department of Mechanical Engineering	Summer 2016-Spring 2017
Amy Boulier, Department of Mechanical Engineering	Fall 2016-Spring 2017
Arion Morshedjian, Department of Mechanical Engineering	Fall 2016-Spring 2017
Eyan Goldman, Department of Mechanical Engineering	Fall 2016-Spring 2017
Sofia Diez, Department of Mechanical Engineering	June-August 2016
Brett Caggiano, Department of Mechanical Engineering	June-August 2016

### [Visiting Students]

Jiixin Xu (Undergraduate student from University of Nottingham, Ningbo, China)	July 2017-December 2017
Jing Li (Ph.D. student from Wuhan University of Technology)	September 2015-August 2017
Shaoyang Qu (Undergraduate student from Tsinghua University)	July 2017-September 2017
Junjie Pan (Undergraduate student from Chongqing University)	January 2017-May 2017
- <i>Currently MSE student at Johns Hopkins University</i>	
Bohan Wang (Undergraduate student from Tsinghua University)	July 2016-January 2017
- <i>Currently PhD student at University of Illinois, Urbana-Champaign</i>	
Peisheng He (Undergraduate student from Shanghai Jia Tong University)	September 2016-January 2017
Moses Kayondo (HEMI Extreme Science intern from Morgan State University)	June-August 2015, 2016
Tila Assgari (HEMI Extreme Arts intern from Maryland Institute College of Art)	June-August 2016
Yancheng Du (Undergraduate student from Tsinghua University)	July-August 2016
- <i>Currently PhD student at Purdue University</i>	
Zeyu Zhu (Undergraduate student from Shanghai Jia Tong University)	July-September 2016
- <i>Currently MSE student at Johns Hopkins University</i>	

Bo Yuan (Undergraduate student from Tsinghua University) - <i>Currently PhD student at Tsinghua University</i>	October 2015-February 2016
Liujiang Yan (Undergraduate student from Tsinghua University) - <i>Currently MSE student at Johns Hopkins University</i>	July-August 2015
Amanda Metcalf (HEMI Extreme Arts intern from Maryland Institute College of Art)	June-August 2015
Daksh Arora (Undergraduate student from Indian Institute of Technology, Delhi) - <i>Currently MSE student at Cornell University</i>	May-July 2015
Dharmendra Sharma (Undergraduate student from Indian Institute of Technology, Kharagpur) - <i>Currently Associate Consultant at Ernst &amp; Young LLP</i>	May-July 2015

## **OUTREACH**

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<b>Johns Hopkins University</b>	Baltimore, MD
Host for the visit of students and teachers from Joint Science and Technology Institute	August 2017

Invited Speaker at the Center for Education Outreach - Gave lectures on 3D printing for high school students	June 2017, July 2016
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Host for the visit of students and parents participating Summer program at Center for Talented Youth	July 2017
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<b>Museum of Science, Boston</b>	Boston, MA
Volunteer for Nano Days - Conducted interactive hands-on demonstration of nanoscience for general public of various age groups.	April 2013, March 2011 & 2010

<b>Park Street School/Park Street Kids</b>	Boston, MA
Mentor for the annual science fair of the Park Street School - Helped two sixth grade students to formulate problems, design experiments, and analyze results.	January-February 2014

Volunteer for a preschool class - Conducted interactive hands-on science demonstrations for sixteen preschool students and teachers.	March 2012
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## **TEACHING**

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<b>Johns Hopkins University</b>	Baltimore, MD
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Instructor for EN. 530.352 Materials Selection - Teaches undergraduate core course on materials selection. - 35 students from mechanical engineering enrolled.	Fall 2017
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Instructor for EN. 530.809 Mechanics of Materials and Structures Graduate Seminar - Guides the mechanics of materials and structures graduate student seminar series. - 40 students from mechanical engineering enrolled.	Fall 2017
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Instructor for EN. 530.417/618 Fabricatology – Advanced Materials Processing - Teaches undergraduate/graduate course on fabrication. - 31 students with various majors (mechanical engineering, engineering management, chemical biomolecular engineering, biomedical engineering, electrical engineering) enrolled.	Spring 2017
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Instructor for EN 530.436/636 Bioinspired Science and Technology - Developed a new undergraduate/graduate course on bioinspired science and technology. - 42 students with various majors (mechanical engineering, engineering management, biomedical engineering) are enrolled.	Fall 2016
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Instructor for EN. 530.417/618 Fabricatology – Advanced Materials Processing Spring 2016  
- Taught undergraduate/graduate course on fabrication.  
- 20 students with various majors (mechanical engineering, engineering management, biomedical engineering) enrolled.

Instructor for EN. 530.618 Fabricatology – Advanced Materials Processing Spring 2015  
- Developed a new graduate course on fabrication.  
- 24 students with various majors (mechanical engineering, engineering management, materials science, civil engineering) enrolled.

### **Thesis Committee Member**

Mr. Zhiren Zhu (MSE candidate in Civil Engineering) August 2017  
“Computational Analysis of Piezoelectric Systems Using a Coupled Multiphysics Finite Element Model”

Mr. Shu Guo (Ph.D. candidate in Civil Engineering) April 2017  
“A Coupled Multi-physics Analysis Model for Integrating Transient Electro-Magnetics and Structural Dynamic Fields with Damage”

Mr. Xiaotong Fu (Ph.D. candidate in Chemical and Biomolecular Engineering) December 2016  
“A New Platform For Microfluidic Sample Preparation Using On-Chip Electrokinetics”

Mr. Charles Dhong (Ph.D. candidate in Chemical and Biomolecular Engineering) October 2016  
“Peeling Structured Surfaces in Viscous Environments: The Role of Deformation and Drainage Channels”

Mr. Longyu Zhao (Ph.D. candidate in Materials Science) February 2016-April 2016  
“Design and Characterization of Fluidic and Thermal Properties of 3D Woven Lattice Materials for Heat Exchange Applications”

Ms. Barbara Muriene (Ph.D. candidate in Mechanical Engineering) January-March 2016  
"Glycosaminoglycan Contribution to the Structure-Mechanical Properties of the Posterior Sclera"

Mr. Changkyu Yoon (Ph.D. candidate in Materials Science) May 2015-December 2016  
“Design, Characterization & Application of Stimuli Responsive Self-Folding Soft Microsystems”

### **Graduate Board Oral Examination Committee Member**

Mr. Raleigh Linville (Ph.D. candidate in Biomedical Engineering) June 2017

Ms. Fatma Madouh (Ph.D. candidate in Mechanical Engineering) May, October 2017

Mr. Reza Yaghmaie (Ph.D. candidate in Civil Engineering) September 2016

Ms. Hahn Le (Ph.D. candidate in Electrical and Computer Engineering) August 2016

Mr. Longyu Zhao (Ph.D. candidate in Materials Science) April 2016

Mr. Gyeongwoo Cheon (Ph.D. candidate in Electrical and Computer Engineering) May 2015

## **PROFESSIONAL SOCIETIES AND SERVICE**

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**Editorial Board Member** – Scientific Reports November 2014-October 2017

**Guest Editor** – February 2016 issue of Materials Research Society Bulletin (“Beyond Conventional Lithography: Patterning via Self-Organization and Self-Folding”)

**Member** - American Society of Mechanical Engineers, Materials Research Society, Society of Engineering Science, American Physical Society.

**Journal Reviewer** – Science, Advanced Materials, ACS Materials & Interfaces, Nanoscale, Soft Matter, Applied Physics Letters, Composites Part A, Smart Materials and Structures, Bioinspiration & Biomimetics, Advanced Materials Technologies, Science Advances, Journal of Mechanics of Materials and Structures, Journal of Mechanical Design, Micromachines, MRS Advances.

**Proposal Reviewer** - National Science Foundation, Army Research Office, American Chemical Society Petroleum Research Fund, Fonds de recherche du Québec.

**Invited Workshop Attendee**

ARO Workshop on the Future of Vibration Energy Transfer in Solids and Structures October 2016

Invitee, National Academy of Engineering's US Frontiers of Engineering Symposium September 2016  
*- 100 engineers, generally 30-45 years old from industry, universities, and government labs are invited to represent the full range of engineering fields.*

NSF Workshop on Interdisciplinary Frontiers of Designing Engineering Material Systems July 2016

**Professional Society Technical Committee Leadership** - Editor (2017), Secretary (2018), Vice Chair (2019), Chair (2020), ASME Technical Committee on Mechanics of Soft Materials

**Conference Co-Organizer**

ASME International Mechanical Engineering Congress & Exposition – Mechanics of Soft Materials 2018

ASME International Mechanical Engineering Congress & Exposition – Mechanical Metamaterials 2018

ASME International Mechanical Engineering Congress & Exposition – 3D Printed Soft Materials 2018

U.S. National Congress for Theoretical and Applied Mechanics 2018

- Mechanics and Physics of Soft Materials: Instability and Manufacturing of Soft Materials

U.S. National Congress for Theoretical and Applied Mechanics 2018

- Mechanics and Physics of Soft Materials: Soft Active Materials

American Physical Society March Meeting - Focus Session on Mechanical Metamaterials 2018

American Physical Society March Meeting - Focus Session on Physics of Bioinspired Materials 2018

American Physical Society March Meeting 2018

- Invited Session on Lessons from Biological Soft Materials and Their Applications

ASME International Mechanical Engineering Congress & Exposition – Mechanics of Soft Materials 2017

ASME International Mechanical Engineering Congress & Exposition – Mechanical Metamaterials 2017

Society of Engineering Science Annual Meeting - Mechanics of 3D Printed Materials and Structures 2017

American Physical Society March Meeting - Focus Session on Physics of Bioinspired Materials 2017

ASME International Mechanical Engineering Congress & Exposition - 3D Printed Soft Materials 2016

Society of Engineering Science Annual Meeting - Mechanics of 3D Printed Materials and Structures 2016

American Physical Society March Meeting – Focus Session on Physics of Bioinspired Materials 2016

**Conference Student Poster Competition Judge**

Society of Engineering Science Annual Meeting 2017

**Faculty Mentoring Focus Group** – Whiting School of Engineering May 2015-Present

**Department Committee**

2015-Present

ME Seminar Series & Course (Chair), Graduate Admission Committee (Member), Manufacturing Engineering ad hoc Committee (Member)

**Hopkins Extreme Materials Institute Committee**  
HEMI Seminar Committee (Chair), Academic Committee (Member)

2015-Present

## **FUNDING**

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**Air Force Office of Scientific Research (PI)** January 2018-January 2021

- *Bioinspired Synthesis of Multifunctional Materials with Self-adaptable Mechanical Properties and Self-regeneration* (total award: \$450,000)

**Army Research Office (co PI)** May 2017-April 2021

- *Extreme Dissipation Behavior of Main-Chain Liquid-Crystal Elastomers and Structures* (total award: \$588,585)

**National Institute of Health, R21/R33 Grant (co PI)** December 2016-November 2018

- *Self-Unfolding RV-PA 3D Printed Conduits* (total award: \$237,231)

**National Science Foundation DMREF Program (co PI)** September 2016-August 2020

- *Predictive Multiscale Modeling of the Mechanical Properties of Polymers 3D Printed Using Fused Filament Fabrication* (total award: \$1,600,000)

**Johns Hopkins Environment, Energy, Sustainability & Health Institute (co PI)** July 2015-June 2016

- *Harvesting Energy from Flow-Induced Flutter of 'Piezoleaves' for Self-Powered Sensors* (total award: \$25,000)