

Seungbae Park, Ph.D.

SUNY Distinguished Professor, IEEE Fellow, ASME Fellow

Department of Mechanical Engineering

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Education

Purdue University, West Lafayette, Indiana

- Ph.D. in Aerospace Engineering 1994

Seoul National University, Seoul, South Korea

- M.S., B.S. Aerospace Engineering

Professional Experience

- 2015 to Present *Director*, Integrated Electronics Engineering Center (IEEC), a New York State Center of Advanced Technology, Vestal, New York
- 2024 to present SUNY Distinguished Professor
- 2013 to 2024 *Professor*, Mechanical Engineering, Binghamton University, Vestal, New York
- 2007 to 2013 *Associate Professor*, Mechanical Engineering, Binghamton University, Vestal, New York
- 2008 to 2009 *Technical Advisor (Resident)*, Samsung Electronics, South Korea
- 2008 to 2009 *Visiting Professor*, Konkuk University, Seoul, South Korea
- 2002 to 2007 *Assistant Professor*, Mechanical Engineering, Binghamton University, Vestal, New York
- 1996 to 2002 *Advisory Engineer*, IBM Microelectronics, Endicott and East Fishkill, New York
- 1999 *Lecturer*, Mechanical Engineering, Binghamton University, Vestal, New York
- 1995 *Research Engineer*, Mechanical & Aerospace Engineering, University of California, Los Angeles, Los Angeles, California
- 1994 to 1995 *Post-Doctoral Fellow*, Purdue University, West Lafayette, Indiana

Research and Scholarly Activities

Research Interests and Impacts

- Internationally recognized expert in reliability engineering for microelectronics components and systems
 - Impactful scholarly publications
 - Influence concurrent engineering field in leading edge industry including Samsung Electronics, Microsoft Corporation, Xilinx, Apple Inc., Analog Devices Inc., and Corning Inc.

- Pioneered the use of optical techniques to electronics manufacturing and design processes including:
 - Moiré Interferometry
 - 3D Digital Image Correlation with real-time environmental chambers
- Created “Warpage Engineering” for advanced package design for reliability
 - Addressed Chip Package Interaction for 2.5D and 3D Packaging
 - Presented many invited lectures and seminars
 - Solved challenging issues of advanced microelectronics packaging
- Established Smart Electronics Manufacturing Laboratory (SEML)
 - Inclusion of artificial intelligence (AI) for the real time control of surface mount assembly lines
 - Exercised Industry 4.0
 - Advanced research vis-à-vis the reliability of electronics packaging
- Introduced advanced simulations techniques for multi-physics phenomenon of electronics packaging
 - Shed light on actual Power Cycling (PC) over the traditional Accelerated Temperature Cycling (ATC)
 - Moisture induced phenomena in electronics packaging
- Leadership in technical communities and committees
 - Executive Committee Member and Chair, American Society of Mechanical Engineers (ASME) Electronics and Photonics Packaging Division (EPPD)
 - Institute of Electrical and Electronics Engineers (IEEE) - Electronic Components and Technology Conference (ECTC) Technical Committee, Heterogeneous Integration Roadmap Committee
 - Electronics Packaging Division Chair, Society of Experimental Mechanics (SEM)

Awards

- 2024 SUNY Distinguished Professor
- 2023 Fellow, Institute for Electrical and Electronics Engineers (IEEE)
- 2021 Fellow, American Society of Mechanical Engineers (ASME)
- 2020 Regional Contributions Award (\$1,000 cash award), IEEE-Electronic Packaging Society, Region 1-7&9, <https://eps.ieee.org/awards/regional-contributions-award.html>
- 2020 Best Interactive Paper Award (\$1,000 cash award)
 - J. Xu, H. Wang, V. Pham, S. Park, H. Lee, G. Refai-Ahmed, “An Assessment of Electromigration in 2.5D Packaging”, *Institute of Electrical and Electronics Engineer Electronic Components and Technology Conference*, Orlando, Florida, 2020.
- 2019 Clock Award, ASME K-16 Committee on Heat Transfer of Electronics and Photonics Packaging Division (EPPD)
- 2018 Mechanics Award, ASME Electronics and Photonics Packaging Division
- 2017 Best Paper Award:
 - J. Wang, S. Park, “Non-Linear Finite Element Analysis on Stacked Die Package Subjected to Integrated Vapor-Hygro-Thermal-Mechanical Stress”, *Institute of Electrical and Electronics Engineer Electronic Components and Technology Conference*, Orlando, Florida, 2017.

- 2016 Recognition Award for “Contribution to Joint Technology Collaboration,” ASE Group, Taiwan
- 2015 New York State Assembly Citation for “Technology Innovation Leader of the Year” Award
- 2015 President’s Award for “International Education of the Year,” Binghamton University, Vestal, NY
- 2013 Best Paper Award:
 - L. Xue, Y. Niu, H. Lee, D. Yu, S. Chaparala, S. Park, “An Experimental and Numerical Study of the Dynamic Fracture of Glass”, *The American Society of Mechanical Engineers InterPACK*, San Francisco, California, IPACK 2013-73292, 2013.
- 2010 Recognition Award, Samsung Electronics
- 2006 Best Paper Award, ASME/ITHERM 2006 Conference, San Diego, California
- 1999 Stock Option Award for Distinguished Performer, IBM Microelectronics Division
- 1998 Invention Achievement Award, IBM Microelectronics Division
- 1998 Selected as an Executive Resource, IBM Microelectronics Division
- 1998 Recognition Award, 4MB SRAM Task Force, IBM Microelectronics Division
- 1996 Best Paper Award
 - S. Park, “Linear and Nonlinear Behavior of Piezoelectric Materials,” Adaptive Structures and Material Systems, Aerospace Division, *The American Society of Mechanical Engineers/SPIE*, San Diego, California, 1996.
- 1994 Merit Honor Scholarship, Korean Government Overseas Study August 1991 to July 1994

Publications

Per Google Scholar:

Total Citation: 5247

H-index: 33

i10-index: 124

Book Chapters

1. C. Singh, S. Chaparala, S. Park, “Measurement of Dynamic Response Parameters of an Underdamped System,” in *Dynamic Behavior of Materials, Volume 1: Proceedings of the 2016 Annual Conference on Experimental and Applied Mechanics*, D. Casem, L. Lamberson, J. Kimberley, Eds. Cham: Springer International Publishing, pp. 59–67, 2016.
2. S. Sathe, S. Park. “Modeling, Simulation and Design Tools”, *2007 iNEMI Roadmap International Electronics Manufacturing Initiative, Inc.*, Herndon, Virginia, 2007.
3. S. Sathe, S. Park. “Modeling, Simulation and Design Tools”, *2004 iNEMI Roadmap, International Electronics Manufacturing Initiative, Inc.*, Herndon, Virginia, 2004.

Articles in Refereed Journals

1. Y. Lai, K. Pan, S. Park, "Thermo-mechanical Reliability of Glass Substrate and Through Glass Via (TGV): A Comprehensive Review", *Microelectronics Reliability*, Vol 161, 10.1016/j.microrel.2024.115477, 2024
2. C. Cai, H. Wang, J. Yang, P. Yin, S. Park, "A Comprehensive Study on Characterization of Residual Stress of Build-Up Layer and Prediction of Chip Warpage", *Journal of Electronic Packaging*, Vol. 146, No. 2, 2024.
3. J. Ha, Y. Lai, J. Yang, P. Yin, S. Park, "Effect of Differently Shaped Solder Joints of Chip Resistor on Fatigue Life", *Journal of Electronic Packaging*, Vol. 146, No. 2, 2024.
4. K. Pan, J. Yang, Y. Lai, S. Park, C. Okoro, D. Joshi, S. Pollard, "High Temperature Constitutive Behavior of Electroplated Copper TGV through Numerical Simulation", *IEEE Transactions on Components, Packaging and Manufacturing Technology*, Vol. 13, Issue 11, pp. 1861-1867, 10.1109/TCPMT.2023.3322423, 2023.
5. K. A. Deo, S. Park, R. N. Kono, "Influence of Copper Pad Dimension on Thermal Fatigue Life Performance of BGA Packages", *IEEE Transactions on Components, Packaging and Manufacturing Technology*, Vol. 13, No. 9, pp. 1388-1398, 10.1109/TCPMT. 2023.3305935, 2023.
6. Y. Lai, J. Ha, K. Deo, J. Yang, P. Yin, S. Park, "Reflow Recipe Establishment Based on CFD-Informed Machine Learning Model", *IEEE Transactions on Components, Packaging and Manufacturing Technology*, Vol. 13, No.1, pp. 127-134. 10.1109/TCPMT. 2023.3239304, 2023.
7. Y. Lai, S. Park, "Reflow Profiling with the Aid of Machine Learning Models", *Soldering and Surface Mount Technology*, Vol. 35, No. 5, pp. 257-264, 2023.
8. J. Ha, Y. Lai, J. Yang, P. Yin, S. Park, "Enhanced Solder Fatigue Life of Chip Resistor by Optimizing Solder Shape", *Microelectronics Reliability*, Vol. 145, pp. 114994, 10.1016 /j.microrel.2023.114994, 2023.
9. P. Yin, S. Park, B. Jacob, A. Gowda, "Enhanced Foam Package Design for Drop/Impact Using Accurate Predictive Simulation", *IEEE Transactions on Components, Packaging and Manufacturing Technology*, Vol. 13, No. 5, pp. 638-645, 2023.
10. Y. Lai, K. Pan, C. Cai, P. Yin, J. Yang, S. Park, "Smarter Temperature Setup for Reflow Oven to Minimize Temperature Variation Among Components", *IEEE Transactions on Components, Packaging and Manufacturing Technology*, Vol 12, No. 3, pp. 562-569, 2022.
11. Y. Lai, K. Pan, Y. Cen, J. Yang, C. Cai, P. Yin, S. Park, "An Intelligent System for Reflow Oven Temperature Settings Based on Hybrid Physics-Machine Learning Method", *Soldering & Surface Mount Technology*, Vol 34, Issue 5, pp. 266-276, DOI 10.1108/SSMT-10-2021-0063, 2022
12. K. Pan, J. Xu, Y. Lai, S. Park, C. Okoro, D. Joshi, S. Pollard, "In-Situ Temperature-Dependent Characterization of Copper Through Glass Via (TGV)", *Microelectronics Reliability*, Vol. 129, pp. 114487, 2022.
13. C. Cai, J. Xu, H. Wang, S. Park, "A Comparative Study of Thermal Fatigue Life of Eutectic Sn-Bi, Hybrid Sn-Bi/SAC and SAC Solder Alloy BGAs", *Microelectronics Reliability*, Vol. 119, pp. 114065, 2021.
14. J. He, Y. Cen, Y. Li, S. Park, D. Won, "The Dissimilar Self-Alignment Characteristics of Smaller Passive Components in the Length and Width Directions", *Journal of Surface Mount Technology*, Vol. 34, Issue 2, pp. 7-15, 2021.

15. S. Shao, Y. Niu, J. Wang, S. Park, "Accessible Determination of Die-to-Wafer Bond Strength with the Schwickerath Test", *Engineering Fracture Mechanics*, Vol. 229, pp. 106929, 2020.
16. J. Wang, Y. Niu, S. Shao, H. Wang, J. Xu S. Park, "A Comprehensive Solution for Modeling Moisture Induced Delamination in Electronic Packaging during Solder Reflow", *Microelectronics Reliability*, Vol. 112, pp. 113791, 2020.
17. S. Shao, Y. Niu, J. Wang, R. Liu, S. Park, H. Lee, L. Yip. G. Refai-Ahmed, "Design Guideline on Board-Level Thermomechanical Reliability of 2.5D Package", *Microelectronics Reliability*, Vol. 111, pp. 113701, 2020.
18. K. Pan, J. Ha, H. Wang, J. Xu, S. Park, "An Analysis of Solder Joint Formation and Self-Alignment of Chip Capacitors", *IEEE Transactions on Components, Packaging, and Manufacturing Technology*, Vol. 11, Issue 1, pp. 161–168, 2020.
19. H. Wang, K. Pan, J. Ha, C. Cai, J. Xu, S. Park, "The Effect of Solder Paste Volume on Chip Resistor Solder Joint Fatigue Life", *Procedia Manufacturing*, Ireland, Vol. 38, pp. 1372-1380, 2019.
20. K. Pan, J. Ha, H. Wang, V. Veeraraghavan, S. Park, "The Effect of Solder Paste Volume on Surface Mount Assembly Self-Alignment", *Procedia Manufacturing*, Ireland, Vol. 38, pp. 1381-1393, 2019.
21. I. Parvizimran, S. Cao, V. Veeraraghavan, H. Yang, S. Park, D. Won, "Data Driven Prediction Model of Components Shift During Reflow Process in Surface Mount Technology", *Procedia Manufacturing*, Ireland, Vol. 39, pp. 100-107, 2019.
22. S. Cao, I. Parvizimran, S. Park, D. Won, "Statistical Analysis for Component Shift in Pick and Place Process of Surface Mount Technology", *Procedia Manufacturing*, Ireland, Vol. 38, pp. 217-224, 2019.
23. H. Lu, H. Wang, S. Yoon, D. Won, S. Park, "Dynamic Predictive Modeling of Solder Paste Volume with Real Time Memory Update in a Stencil Printing Process", *Procedia Manufacturing*, Ireland, Vol. 38, pp. 108-116, 2019.
24. I. Parvizimran, S. Cao, H. Yang, S. Park, D. Won, "Optimization of Passive Chip Components Placement with Self-Alignment Effect for Advanced Surface Mounting Technology", *Procedia Manufacturing*, Ireland, Vol. 39, pp. 202-209, 2019.
25. S. Cao, I. Parvizimran, H. Yang, S. Park, D. Won, "Prediction of Component Shifts in Pick and Place Process of Surface Mount Technology Using Support Vector Regression", *Procedia Manufacturing*, Ireland, Vol. 39, pp. 210-217, 2019.
26. Y. Niu, V. Pham, J. Wang, S. Park, "An Accurate Experimental Determination of Effective Strain for Heterogeneous Electronic Packages with Digital Image Correlation Method", *IEEE Transactions on Components, Packaging, and Manufacturing Technology*, Vol. 8, Issue 4, pp. 678-688, 2018.
27. Y. Niu, J. Wang, S. Shao, H. Wang, H.H. Lee, S. Park, "A Comprehensive Solution for Electronic Packages' Reliability Assessment with Digital Image Correlation Method", *Microelectronics Reliability*, Vol. 87, pp. 81-88, 2018.
28. S. Shao, D. Liu, Y. Niu, K. O'Donnell, D. Sengupta, S. Park, "A Study on the Thermomechanical Reliability Risks of Through-Silicon-Vias in Sensor Applications", *Sensors*, Vol. 17, Issue 2, pp. 322, 2017.
29. J. Wang, R. Liu, D. Liu, S. Park, "Advancement in Simulating Moisture Diffusion in Electronic Packages under Dynamic Thermal Loading Conditions", *Microelectronics Reliability*, Vol. 73, pp. 42-53, 2017.

30. Y. Niu, H. Wang, S. Park, "A General Strategy of In-Situ Warpage Characterization for Solder Attached Packages with Digital Image Correlation Method", *Optics and Lasers in Engineering*, Vol. 93, pp. 9–18, 2017.
31. Y. Niu, S. Shao, S. Park, C. L. Kao, "A Novel Speckle-Free Digital Image Correlation Method for In-Situ Warpage Characterization", *IEEE Transactions on Components, Packaging, and Manufacturing Technology*, Vol. 7, Issue 2, pp. 276-284, 2017.
32. Y. Kim, A. Y. Park, C. L. Kao, M. Su, B. Black, S. Park, "Prediction of Deformation During Manufacturing Processes of Silicon Interposer Package with TSVs", *Microelectronics Reliability*, Vol. 65, pp. 234–242, 2016.
33. A. Y. Park, S. C. Chaparala, S. B. Park, "Risk Assessment of the Crack Propagation and Delamination of the Cu-to-Cu Direct Bonded (CuDB) Interface", *Microelectronics Reliability*, Vol. 66, pp. 113–121, 2016.
34. E. H. Wong, S. B. Park, "Moisture Diffusion Modeling – A Critical Review", *Microelectronics Reliability*, Vol. 65, pp. 318–326, 2016.
35. D. Liu, J. Wang, R. Liu, S. Park, "An Examination on the Direct Concentration Approach to Simulating Moisture Diffusion in a Multi-Material System", *Microelectronics Reliability*, Vol. 60, pp. 109-115, 2016.
36. Y. Kim, D. Liu, H. Lee, R. Liu, D. Sengupta, S. Park, "Investigation of Stress in MEMS Sensor Device due to Hygroscopic and Viscoelastic Behavior of Molding Compound", *IEEE Transactions on Components, Packaging and Manufacturing Technology*, Vol. 5, No. 7, pp. 945-954, 2015.
37. D. Liu, J. Wang, R. Liu, S. Park, "An Examination on the Direct Concentration Approach to Simulating Moisture Diffusion in a Multi-Material System", *Microelectronics Reliability*, Vol. 60, pp. 109–115, 2015.
38. S. Chaparala, L. Xue, D. Yu, S. Park, "Dynamics Behavior of Flat Glass Panels under Impact Conditions: Experiments and Numerical Modeling", *Journal of the Society for Information Display*, Vol. 23, Issue 3, pp. 97–106, 2015.
39. J. Kwak, S. Park, "Integrated Hygro-Swelling and Thermo-Mechanical Behavior of Mold Compound for MEMS Package during Reflow after Moisture Preconditioning", *Microelectronics International*, Vol. 32, Issue 1, pp. 8 – 17, 2015.
40. A. Y. Park, S. Park, C. D. Yoo, "Development of Inclined Conductive Bump for Flip-Chip Interconnection", *IEEE Transactions on Components, Packaging, and Manufacturing Technology*, Vol. 5, No. 2, pp. 207–216, 2014.
41. D. Liu, S. Park, "Three-Dimensional and 2.5-Dimensional Interconnection Technology: State of the Art", *Journal of Electronic Packaging*, Vol. 136, Issue 1, pp. 014001, 2014.
42. D. Liu, S. Park, "A Note on the Normalized Approach to Simulating Moisture Diffusion in a Multimaterial System Under Transient Thermal Conditions Using ANSYS 14 and 14.5", *Journal of Electronic Packaging*, Vol. 136, Issue 3, pp. 034501, 2014.
43. Y. Kim, H. Lee, X. Zhang, S. Park, "Optimal Material Property of Molding Compounds for MEMS Package", *IEEE Transactions on Components, Packaging and Manufacturing Technology*, Vol. 4, Issue 10, pp. 1589-1597, 2014.
44. S. Chung, S. Park, "Effects of Temperature on Mechanical Properties of SU-8 Photoresist Material", *Journal of Mechanical Science and Technology*, Vol. 27, No. 9, pp. 2701-2707, 2013.

45. D. Yu, J. Kwak, S. Park, S. Chung, J.Y. Yoon, "Effect of Shield-Can on Dynamic Response of Board-Level Assembly", *Journal of Electronic Packaging*, Vol. 134, No. 3, pp. 031010, 2012.
46. D. Yu, H. Lee, S. Park, "Reliability Assessment of Preloaded Solder Joint Under Thermal Cycling", *Journal of Electronic Packaging*, Vol. 134, No. 4, pp. 041008, 2012.
47. H. Lee, H. Cho, S. Park, "Review of the F-16 Individual Aircraft Tracking Program", *Journal of Aircraft*, Vol. 49, No. 5, pp. 1398-1405, DOI: 10.2514/1.C031692, 2012.
48. D. Suh, S. Park, "Transport Phenomena in Proton Exchange Membrane Fuel Cells and Over-Potential Distribution of Membrane Electrode Assembly", *International Journal of Thermal Sciences*, Vol. 51, pp. 31-41, 2012.
49. T. T. Nguyen, D. Yu, S. Park, "Characterizing the Material Properties of SAC105, SAC305, and SAC405 Solder Joints by Digital Image Correlation", *Journal of Electronic Materials*, Vol. 40, No. 6, pp. 1409-1415, DOI: 10.1007/s11664-011-1534-z, 2011.
50. T.T. Nguyen, S. Park, "Characterization of Elasto-Plastic Behavior of Actual SAC Solder Joints for Drop Test Modeling", *Microelectronics Reliability*, Vol. 51, Issue 8, pp. 1385-1392, 2011.
51. D. Yu, A. Al-Yafawi, T.T. Nguyen, S. Park, S.W. Chung, "High-Cycle Fatigue Life Prediction for Pb-free BGA under Random Vibration Loading", *Microelectronics Reliability*, Vol. 51, Issue 3, pp. 649-656, 2011. **(Cited: 165)**
52. T.T. Nguyen, D.G. Lee, J. Kwak, S. Park, "Effect of Glue on Reliability of Flip Chip BGA Packages Under Thermal Cycling", *Microelectronics Reliability*, Vol. 50, Issue 7, pp. 1000-1006, 2010.
53. H. Lee, S. Park, H. Kim, "Estimation of Aircraft Structural Fatigue Life Using the Crack Severity Index Methodology", *Journal of Aircraft*, Vol. 47, No. 5, pp. 1672-1678, DOI: 10.2514/1.C000250, 2010.
54. D. Yu, A. Al-Yafawi, T.T. Nguyen, S.B. Park, S.W. Chung, "High-Cycle Fatigue Life Prediction for Pb-Free BGA under Random Vibration Loading", *Microelectronics Reliability*, Vol. 51, Issue 3, pp. 649-656, 2010.
55. D. Yu, J. Kwak S. Park, "Dynamic Responses of PCB under Product-Level Free Drop Impact", *Microelectronics Reliability*, Vol. 50, Issue 7, pp. 1028-1038, 2010.
56. Z. Wang, H. Du, S. Park, H. Xie, "Three-Dimensional Shape Measurement with a Fast and Accurate Approach", *Applied Optics*, Vol. 48, No. 6, pp. 1052-1061, 2009.
57. S. Park, R. Joshi, I. Ahmed, S. Chung, "Comparative Studies on Solder Joint Reliability of Plastic and Ceramic Ball Grid Array Packages of the Same Form Factor Under Power and Accelerated Thermal Cycling", *Journal of Electronic Packaging*, Vol. 130, Issue 4, pp. 041004, DOI:10.1115/1.2993146, 2008.
58. C. Jang, S. Park, B. Infantolino, L. Lehman, R. Morgan, D. Sengupta, "Failure Analysis of Contact Probe Pins for SnPb and Sn Applications", *Microelectronics Reliability*, Vol. 48, Issue 6, pp. 942-947, 2008.
59. S. Chung, S. Park, "Numerical Investigation of Underfill Failure due to Phase Change of Pb-free Flip-Chip Solders during Board-Level Reflow", *IEEE Transactions on Components, Packaging, and Manufacturing Technology*, Vol. 31, No. 3, pp. 661-669, DOI: 10.1109/TCAPT.2008.922010, 2008.
60. R. Joshi S. Park, "Comparison of Thermo-Mechanical Behavior of Lead-Free Copper and Tin-Lead Column Grid Array Package", *Microelectronics Reliability*, Vol. 48. Issue 5, pp. 763-772, 2008.

61. S. Park, C. Shah, J. Kwak, C. Jang, S. Chung, J. Pitarresi, "Measurement of Transient Dynamic Response of Circuit Boards of a Handheld Device during Drop using 3D Digital Image Correlation", *Journal of Electronic Packaging*, Vol. 130, Issue 4, pp. 044502, DOI:10.1115/1.3000097, 2008.
62. T. Nguyen, N. Goo, V. Nguyen, Y. Yoo, S. Park, "Design, Fabrication, and Experimental Characterization of a Flap Valve IPMC Micropump with a Flexibly Supported Diaphragm", *Sensors and Actuators A: Physical*, Vol. 141, Issue 2, pp. 640-648, 2008. **(Cited: 135)**
63. C. Jang, S. Park, B. Han, S. Yoon, "Advanced Thermal-Moisture Analogy Scheme for Anisothermal Moisture Diffusion Problem", *Journal of Electronic Packaging*, Vol. 130, Issue 1, pp. 011004, DOI:10.1115/1.2837521, 2008.
64. S. Park, J. Kim, H. Schoeler, J. Cho, "Effect of Oxidation in Indium Solderability," *Journal of Electronic Materials*, Vol. 37, No. 4, pp. 483-489, 2008.
65. S. Zhang, S. Park, M. Judy, "Accurate Assessment of Packaging Stress Effects on MEMS Sensors by Measurement and Sensor-Package Interaction Simulations", *Journal of MEMS*, Vol. 16, No. 3, pp. 639-649, 2007.
66. S. Park, H.C. Lee, B. Sammakia, K. Raghunathan, "Predictive Model for Optimized Design Parameters in Flip-Chip Packages and Assemblies", *IEEE Transactions on Components and Packaging Technologies*, Vol. 30, No. 2, pp. 294-301, 2007.
67. S. Chung, Z. Tang, S. Park, "Effects of Phase Change of Pb-free Flip-Chip Solders during Board Level Interconnect Reflow", *IEEE Transactions on Advanced Packaging*, Vol. 30, No. 1, pp. 38-43, 2007.
68. S. Park, R. Dhakal, L. Lehman, E. Cotts, "Measurement of Deformations in SnAgCu Solder Interconnects Under In-Situ Thermal Loading", *Acta Materialia*, Vol. 55, No. 9, pp. 3253-3260, 2007. **(Cited: 129)**
69. S. Park, R. Dhakal, L. Lehman, E. Cotts, "Grain Deformations and Strains in Board Level SnAgCu Solder Interconnects Under Deep Thermal Cycling", *IEEE Transactions on Components and Packaging Technology*, Vol. 30, No. 1, pp. 178-185, 2007.
70. S. Park, I. Ahmed, "Shorter Field Life in Power Cycling for Organic Packages", *Journal of Electronic Packaging*, Vol. 129, Issue 1, pp. 28-34, 2007.
71. X. Zhang, S. Park, M. Judy, "Accurate Assessment of Packaging Stress Effects on MEMS Sensors by Measurement and Sensor-Package Interaction Simulations", *Journal of Microelectromechanical Systems*, Vol. 16, Issue 3, pp. 639-649, 2007.
72. R. Yang, D. Sun, S. Park, "A Model of Shear Viscosity for Underfill Flows", *Journal of Electronic Packaging Materials*, Vol. 35, No. 11, pp. 2016-2025, 2006.
73. R. Yang, DC Sun, S. Park, "Effect of Settlement on Dense Slurry Flow in a Horizontal Channel", *Journal of Electronic Packaging Materials*, Vol. 35, No. 11, pp. 2026-2034, 2006.
74. S. Chung, S. Makhar, H. Ackler, S. Park, "Material Characterization of Carbon-Nanotube-Reinforced Polymer Composite", *Electronic Materials Letters*, Vol. 2, No. 3, pp. 175-181 2006.
75. K. Verma, S. Park, B. Han, W. Ackerman, "On the Design Parameters of Flip-Chip PBGA Package Assembly for Optimum Solder Ball Reliability", *IEEE Transactions on Components and Packaging Technologies*, Vol. 24, No. 2, pp. 300-307, 2001.

76. C.T. Sun, S. Park, "Measuring Fracture Toughness of Piezoceramics by Vickers Indentation Under the Influence of Electric Fields", *Ferroelectrics*, Vol. 248, Issue 1, pp. 79-95, 2000.
77. S. Park, S.S. Park, G.P. Carman, H.T. Hahn, "Measuring Strain Distribution During Mesoscopic Domain Reorientation in a Ferroelectric Material", *The American Society of Mechanical Engineers Journal of Materials and Technology*, Vol. 120, Issue 1, pp. 1-6, 1998.
78. S. Park, G.P. Carman, "Minimizing Stress Levels in Piezoelectric Media Containing Elliptical Voids", *Journal of Applied Mechanics*, Vol. 64, No. 3, pp. 466-470, 1997.
79. S. Park, G.P. Carman, "Tailoring the Properties of Piezoelectric Ceramics: Analytical", *International Journal Solids and Structures*, Vol. 34, No. 26, pp. 3385-3399, 1997.
80. B. Han, M. Chopra, S. Park, L. Li, K. Verma, "Effect of Substrate CTE on Solder Ball Reliability of Flip-Chip PBGA Package Assembly", *Journal of Surface Mount Technology*, Vol. 9, pp. 25-34, 1996.
81. C.T. Sun, S. Park, "Fracture Criteria for Piezoelectric Ceramics-Reply", *Journal of American Ceramic Society*, Vol. 79, Issue 4, pp. 1136, 1996.
82. S. Park, C.T. Sun, "Fracture Criteria for Piezoelectric Ceramics", *Journal of American Ceramic Society*, Vol. 78, Issue 6, pp. 1475-1480, 1995. **(Cited: 726)**
83. S.B. Park, C.T. Sun, "Effect of Electric Field on Fracture of Piezoelectric Ceramics", *International Journal of Fracture*, Vol. 70, pp. 203-216, 1993. **(Cited: 455)**
84. S. Park, S.J. Kim, "A Study on the Identification of Damage Variables and Analysis of Process Under Cyclic Loadings: I. Theory and Experiment", *Journal of Korean Society for Aeronautical & Space Sciences*, Vol. 18, No. 2, pp. 39-49, 1990.
85. S.J. Kim, S.B. Park, "On the Identification of Damage Variables and Analysis of Process under Cyclic Loadings: II. Finite Element Analysis", *Journal of Korean Society for Aeronautical & Space Sciences*, Vol. 18, No. 2, pp. 50-59, 1990.
86. S. Park, S.J. Shin, S.C. Beak, S.J. Kim, "Development of Main/Post Processor for A/D Converter", *Journal of Korean Society for Aeronautical & Space Sciences*, Vol. 17, No. 1, pp. 63-79, 1989.

Talks, Abstracts, and Other Professional Papers Presented

Articles

1. S. Park, "Critical Requirement for Next Generation Modeling," Printed Circuit Design & Manufacture, <http://pcdandm.com/cms/cms/content/view/3571/95/>, June 2007.

Refereed Conference Proceedings and Presentations

1. K. A. Deo, Y. Lai, J. Yang, J. H. Ha, S. Park, "Influence of Stiffener Design on Co-Packaged Optics (CPO) 2.5D Heterogeneous Packages", *2024 IEEE 74th Electronic Components and Technology Conference*, Denver, CO, 2024.
2. J. Yang, K. Pan, P. Yin, S. Park, C. Okoro, D. Joshi, S. Pollard, "Adhesion Layer Influence on Thermomechanical Reliability of Electroplated Copper Through Glass Via (TGV)", *2024 IEEE 74th Electronic Components and Technology Conference*, Denver, CO, 2024.
3. Y. Lai, X. Jiefeng, J. Ha, K. A. Deo, J. Yang, S. Park, "Bond-line Thickness Prediction for Thermal Interface Material under Usage Conditions", *2024 IEEE 74th Electronic Components and Technology Conference*, Denver, CO, 2024.

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4. S. Park, R. Dhakal, L. Lehman, E. Cotts, "Role of Thermomechanical Anisotropy in the Failure Mechanism of Lead-Free SnAgCu Ball Grid Array Joints", *Materials and Technology Conference and Exhibition*, Cincinnati, OH, 2006. Invited.
5. S. Park, R. Dhakal, L. Lehman, E. Cotts, "Strain Distribution on Grains of SnAgCu Solder Interconnects", *Materials and Technology Conference and Exhibition*, Cincinnati, OH, 2006. Invited.
6. S. Park, J. Kwak, Chirag Shah, Tim Schmidt, "Mobile Phone Drop Testing Using High Speed Imaging Correlation", *Society for Experimental Mechanics*, St. Louis, MI, 2006.
7. S. Park, R. Dhakal, "Grain Formation and Strain Distribution on Pb-Free SAC Ball Grid Array", *Society for Experimental Mechanics*, St. Louis, MI, 2006.
8. S. Park, R. Dhakal, R. Joshi, "Comparison of Full Field Optical Measurement Techniques: Moiré Interferometry and Digital Image Correlation for BGA Interconnects", *Society for Experimental Mechanics*, Portland, OR, 2005.
9. R. Dahkal, I. Ahmed, S. Park, "Impact of Power Cycling in Plastic and Ceramic Ball Grid Array Packages", *Society of Experimental Mechanics*, Costa Mesa, CA, 2004.
10. S. Park, "Characterization of Warpage of Flip Chip Plastic Ball Grid Array Package and Its Effect on Solder Joint Reliability", *IMAPS Microelectronics International*, Chicago, IL, 1999.
11. S. Park, B. Han, K. Verm, "Characterization of Warpage of Flip-Chip PBGA Package and its Effect on Solder Joint Reliability", *SPIE*, Vol. 3906, pp. 253-258, Denver, CO, 1999.

12. S. Park, "Predictive Modeling for Yield", *IBM Academy of Technology in Yield Learning Conference*, Orlando, FL, 1999. **(Invited)**
13. P. Bharathan, K. Verma, B. Han, S. Park, "On the Design Parameters for Optimum Solder Joint Reliability of Flip-Chip Package Assemblies Subjected to Power Cycling Condition", *Society for Experimental Mechanics Spring Conference and Exhibit*, Houston, TX, 1998.
14. B. Han, S. Park, K. Verma, W. Ackerman, "On the Design Parameters of Flip-Chip PBGA Package Assembly for Optimum Solder Ball Reliability", *International Symposium on Microelectronics*, Chicago, IL, 1999.
15. K. Verma, B. Han, M. Prakash, S. Park, D. Caletka, "Effect of Underfill Encapsulation on the Solder Joint Reliability of Plastic Ball Grid Array Packages", *Institute of Electrical and Electronics Engineers Components, Packaging, and Manufacturing Technology Society, Ball Grid Array/Flip Chip Workshop*, Binghamton, NY, 1996.
16. B. Han, M. Chopra, S. Park, L. Li, K. Verma, "Effect of Substrate CTE on Solder Ball Reliability of Flip Chip PBGA Package Assembly", *Surface Mount International Conference*, San Jose, CA, 1996.

Patents and Invention Disclosures

1. US 6,627,998 B1, "Wafer Scale Thin Film Package", 2003
2. US 6,347,901 B1, "Solder Interconnect Techniques", 2002
3. US 6,288,900 B1, "Warpage Compensating Heat Spreader", 2001
4. US 6,291,776 B1, "Thermal Deformation Management for Chip Carriers", 2001
5. Reworkable Grid Reinforced Package, IBM Technical Disclosure Bulletin (TDB), 199.
6. Improved Small Outline Nolead (SON) Package, IBM Technical Disclosure Bulletin (TDB), 1997

Grant Activities

Contracts and Grants (Totaling over \$16 million)

Directorship of IEEC (A New York State Center of Advanced Technology)

December 2015 – Present

- Expanded Research Activities
 - Establishment of \$3M AI enabled Electronics Manufacturing laboratory, Smart Electronics Manufacturing Laboratory (SEML), to extend IEEC's core area of expertise to manufacturing beyond traditional analytical and diagnostic emphasis. The complete equipment of SMT line is worth more than \$3M - all donated by participating companies including MPM, Koh Young, Takaoka Toko, Fuji, and Universal Instruments.
 - Initiation of member company customized projects; e.g. Sanmina-Viking, Juniper Networks, Xilinx, ASE and ADI.
 - National Traffic Safety Board (NTSB) became a full member equivalent in financial contribution and technical interactions.
 - Leading joint federal funding proposals with member companies
 - SHIPs with GE Global Research

- Cornerstone (DoD)-Domestic Electronic Manufacturing Consortium with GE, Lockheed Martin Corporation, and Universal Instruments
- Initiating University wide proposals to federal/state agencies
 - SAMRI (SUNY-Applied Materials Research Initiative)
 - IBM AI Hardware Center
 - Quantum Computing
- Membership Expansion
 - Recruited additional four full member companies, Koh Young, Xilinx, Juniper Networks, Takaoka Toko.
 - Increased number of associate member companies and technical interactions by monthly visitations in New York State companies; also, IEEC staff frequently visits domestic and international companies.
- Making our annual flagship Electronics Packaging Symposium (EPS) to a World class
 - Achieved attendance of three hundred and eight; more than 50 exhibitors
 - Promoted more participation of BU faculty and students in 50+ poster presentations
 - World-renowned invited speakers
 - Excellent feedback from attendees
- Putting efforts in workforce development
 - Restructured two semester long six credit “Introduction to Electronics Packaging I and II” courses and offered online
- Maintains healthier than ever finance

Reviewing Activities for Journals and Other Publications

- Journal of Composite Materials
- Journal of Intelligent Materials and Systems
- ASME Journal of Electronic Packaging
- Engineering Fracture Mechanics
- International Journal of Fracture
- Experimental/Numerical Mechanics in Electronics Packaging
- IEEE Transaction on Advanced Packaging
- IEEE Transaction on Components and Packaging Technologies
- IEEE Transaction on Electronics Packaging Manufacturing
- Optics and Lasers in Engineering

Miscellaneous

- Evaluated a grant proposal of Cooperative Grants Program 2006 for U.S. Civilian Research and Development Foundation (CRDF), 2006.
- Introduced StatsChipPAC to Integrated Electronics Engineering Center (IEEC) as a Corporate Member, 2005.
- Introduced Samsung Electronics to Integrated Electronics Engineering Center (IEEC) as a Corporate Member, 2003.

Teaching, Mentoring and Advising

Research Laboratory Development:

- The Smart Electronic Manufacturing Laboratory (SEML):
<https://www.binghamton.edu/ieec/facilities/seml/index.html>
 - The objective of the SEMLab is to develop smart electronics manufacturing solutions using data science (DS) and artificial intelligence (AI) principles to assemble sophisticated electronics components, and a surface mount assembly (SMA; module assembled with SMT) line which consists of a set of sequential procedures/equipment: stencil printing process (SPP), mounting, and solder reflow.
 - With support and initial funding from Koh Young Technology Inc., an IEEC member company since 2015 and based in Seoul, Korea, the SEMLab was established in 2016. The lab currently has more than \$3M worth of equipment enabling highly advanced electronics assembly in the lab. Many research faculty and graduate students are utilizing the line for research and education.
- The Opto-mechanics and Physical Reliability Laboratory
<http://me.binghamton.edu/O.M.R.L/Index.htm>
 - It has been expanded from the existing infrastructure. The laboratory was designed to meet the ever-increasing demand for quantitative deformation data from the micro to nano-meter scale. In 2011, the laboratory was moved to the Applied Mechanics Suite in the Engineering and Science Building. The lab is equipped with various classical and modern photomechanics tools for experimental studies of multi-material miniature structures, specifically, microelectronics packaging materials and subassemblies. The techniques routinely practiced in the laboratory include digital image correlation in conjunction with micromechanical testers and high-speed cameras. The laboratory is being utilized for undergraduate/graduate teaching and on-going research activities.

Student Advising: Research Direction

Graduate (23 Completed)

- Izhar Ahmed, Graduated December 2004, Apple Inc.
- Rahul Joshi, Graduated December 2004, Hewlett-Packard Development Company
- Ganesh Iyer, Graduated December 2004, Cisco Systems Inc.
- Karthik Raghunathan, Graduated 2005, Corning Inc.
- Ramji Dhakal, Graduated June 2005, Microsoft Corporation
- Chirag Shah, Graduated May 2007, Apple Inc.
- Aaron Reichman, Graduated May 2007, Intel Corporation
- Khalid Umar, Graduated May 2007, Analog Devices Inc.
- Da Yu, Graduated May 2008, Apple Inc.
- Jaebok Kwak, Graduated August 2008, Chosun University
- Dong-Gun Lee, Graduated August 2009, Korea Institute of Machinery
- Kyung-Taik Park, Graduated August 2009, Manager
- Hyojeong Jeon, Graduated August 2009, Lecturer at College Prep School
- Hohyung Lee, Graduated May 2013, Advanced Micro Devices Inc. (formerly Xilinx)
- Claire Coble, Graduated May 2013, Corning Inc.
- Quang Nguyen, Graduated May 2013, Ph.D. at Auburn University
- Rohit Bhosle, Graduated May 2014, Zimmer Medical
- Charandeep Singh, Graduated May 2014, Corning Inc.

- Junghoon Baek, Graduated May 2016, Korean Air Force
- Junbo Yang, Graduated May 2019, Ph.D. Program at Binghamton University
- Pengcheng Yin, Graduated May 2020, Ph.D. Program at Binghamton University
- Jong Hwan Ha, Graduated May 2020, Ph.D. Program at Binghamton University
- Yangyang Lai, Graduated May 2020, Ph.D. Program at Binghamton University

Doctoral (27 Completed)

- Zhenming Tang, Graduated May 2008, Google
 - Thesis: *Interfacial Reliability of Lead-Free Flip-Chip BGA Package*
- Ramji Dhakal, Graduated August 2008, Microsoft Corporation
 - Thesis: *Microstructure Based Experimental and Finite Element Analysis of Failure Mechanism of Lead-Free BGA Interconnects*
- Hongchul Lee, Graduated May 2009, Aero Tech Research Institute, Airforce
 - Thesis: *Advanced Aircraft Service Life Monitoring Method via Flight-by-Flight Load Spectra*
- Haojun Zhang, Graduated December 2010, Global Foundry
 - Thesis: *Investigation of Hygroscopic Swelling Behavior of Molding Compound and Its Impact on Encapsulated MEMS Packages*
- Abdullah Al-Yafawi, Graduated December 2010, Cobham Mission Systems
 - Thesis: *Electronic Packages Fatigue Life Prediction Under Random Vibration Loading Conditions*
- Tung Nguyen, Graduated December 2010, Microsoft Corporation
 - Thesis: *Characterization of the Elasto-Plastic Behavior of Actual Tin Silver Copper Solder Joints Using DIC*
- Jae Kwak, Graduated December 2010, Faculty at Chosun University
 - Thesis: *Experimental Assessment of Electronic Package Deformation Using Optical Full-Field Deformation Measurement System*
- Dongmyung Suh, Graduated December 2011, Faculty at Alfred University
 - Thesis: *Numerical Modeling Transport Phenomena in Proton Exchange Membrane Fuel Cells*
- Hoyong Lee, Graduated May 2012, Faculty at Kwangju University
 - Thesis: *Avionics Reliability Assurance Guidelines for High Altitude Applications*
- Da Yu, Graduated July 2012, Apple Inc.
 - Thesis: *Fatigue Life Assessment and Prediction of Ball Grid Array Package Under Environmental Conditions*
- Seil Baek, Graduated December 2012, Lieutenant Colonel, Korean Air Force
 - Thesis: *Flight-by-Flight Stress Spectrum Development Methodology for Aircraft Structural Life Assessments*
- Liang Xue, Graduated December 2013, Google
 - Thesis: *Dynamic Behavior of a Tempered Glass Under Impact*
- Yeonsung Kim, Graduated August 2014, Analog Devices Inc.
 - Thesis: *Stress and Deformation Minimization of MEMS Sensor Package and TSV Interposer Package*
- Dapeng Liu, Graduated December 2015, Microsoft Corporation
 - Thesis: *Packaging-Induced Stresses on Microelectromechanical Systems*

- Hohyung Lee, Graduated August 2016, Apple Inc.
 - Thesis: *Investigation of the Time Dependent Property for Packaging Materials*
- Ah-Young Park, Graduated February 2017, Korean Institute Machinery/Materials
 - Thesis: *Thermo-Mechanical Problems and Their Solutions in a 3D Micro-Electronics Package Using Cu-to-Cu Direct Bonding*
- Yuling Niu, Graduated December 2017, Qualcomm Inc.
 - Thesis: *The Development of Digital Image Correlation Method for Electronic Packaging Reliability Assessment*
- Charandeep Singh, Graduated December 2018, Corning Inc.
 - Thesis: *Dynamic Fracture of Brittle Materials*
- Jing Wang , Graduated December 2018, OmniVision Technologies
 - Thesis: *A Study on Thermal and Moisture Impacts on Reliability of Electronic Packaging*
- Chaochao Zhou, Graduated December 2018, Post-Doctoral Research Associate at Massachusetts General Hospital
 - Thesis: *Multi-Objective Design Optimization of a Mobile-Bearing Total Disc Arthroplasty Considering Spinal Kinematics, Facet Joint Loads, and Metal-on-Polyethylene Contact Mechanics*
- Shuai Shao, Graduated December 2018, Baidu Inc.
 - Thesis: *Fast Prediction for Board-level Reliability of Interconnect in Electronic Packaging*
- Huayan Wang, Graduated December 2018, Advanced Micro Devices Inc. (formerly Xilinx)
 - Thesis: *Advances of 2D Micro Digital Image Correlation and Its Usage in Chip Packaging Interaction Analysis*
- Van Lai Pham, Graduated August 2020, Global Foundries
 - Thesis: *Plastic Strain Analysis and Reliability Study of BGA Solder Joint with Digital Image Correlation Technique*
- Jiefeng Xu, Graduated December 2020, Apple Inc.
 - Thesis: *Electromigration Assessment and Prediction in 2nd Level BGA*
- Ruiyang Liu, Graduated in December 2020, Apple Inc.
 - Thesis: *Paging of Polymer Materials and Its Reliability Impacts to 2.5D Electronics Packaging*
- Ke Pan, Graduated May 2022, Apple Inc.
 - Thesis: *Thermomechanical Reliability and Constitutive Investigation of Copper Through Glass Via (TGV) in Glass Interposer*
- Chongyang Cai, Graduated December 2022, Intel Corporation
 - Thesis: *Thermomechanical Reliability and Constitutive Investigation of Copper Through Glass Via (TGV) in Glass Interposer*

In Progress (5)

- Junbo Yang, 3rd Year, expected to finish in May 2024
- Pengcheng Yin, 3rd Year, expected to finish in May 2024
- Jong Hwan Ha, 3rd Year, expected to finish in May 2024
- Yangyang Lai, 3rd Year, expected to finish in August. 2024

- Karthik Deo, 2nd Year, expected to finish in August 2025

Post-Doctoral Fellow (5 Completed)

- Soonwan Chung, 2005-2007, Samsung Electronics
- Changsoo Jang, 2006-2007, Google
- Jongman Kim, 2006-2007, Samsung Electric
- Jia Gao, 2005-2006, Analog Devices Inc.
- Shijun Yu, 2014, Amazon

Services

Offices and Committee Memberships Held in Professional Organizations

1. Chair, IEEE EPS Thermal/Mechanical Technical Committee, 2022-2023.
2. Chair, ASME EPPD Executive Committee, 2022-2023.
3. Chair, ASME EPPD Award Committee, 2019-2021.
4. Member, ASME EPPD Executive Committee, 2018-2022.
5. Chair, ASME EPPD K-16 Committee, 2017-2019.
6. Vice Chair, ASME EPPD K-16 Committee, 2015-2017.
7. Secretary, ASME EPPD K-16 Committee, 2013-2015.
8. Associate Editor, ASME Journal of Electronic Packaging, 2009-2018.
9. Chair, Electronic Packaging Division, Society for Experimental Mechanics, 2005-2010.
10. Division Representative, Electronics and Photonics Packaging Division, for *ASME IMECE 2007*.
11. General Affairs Director, 35th and 36th KSEA (Korean-American Scientists and Engineers Association) Executive Committee, 2006-2008.
12. Member, Applied Reliability Committee of IEEE-ECTC, 2007-present.
13. Vice Division Representative, Electronic and Photonics Packaging Division in *ASME IMECE 2006*.
14. Secretary, “Electronic Packaging” Council of *Society of Experimental Mechanics*, 2003-2005.
15. Member, JEDEC 14-1 Reliability Committee, Co-authored the “Package flatness measurement specification,” 2004-2008.
16. Co-Chair, iNEMI Roadmap Technical Work Group of “Modeling, Simulation and Design Tools,” 2004-2010.
17. Mentor, Semiconductor Research Corporation (SRC) Research Task 1998-2002.
18. Mentor, IBM Fellowship, 1997-2000.

Conference/Symposium Organization

1. Track Chair of Electronics Packaging in *ASME/IMECE 2017-2019*.
2. Track Chair of MEMS Packaging and Reliability in *ASME IMECE 2005*.
3. Track Chair of Mechanics in IITHERM 2014, 2016.
4. Track Chair of Tutorial in InterPACK 2011.
5. Track Chair of Poster Track in ASME/IITHERM 2008.
6. Division Representative of ASME EPPD for *IMECE 2007*.
7. Track Chair of Student Poster in *InterPACK 2007*.
8. Track Chair of Emerging Technology in *ASME/IITHERM 2006*.
9. Track Chair of MEMS Packaging and Reliability in *ASME IMECE 2005*.

10. Review and Paper Selection Committee of *International Reliability Physics Symposium 2005*, March 2005.
11. Co-Organizer of the *1st International Symposium on Optical Methodologies and Metrologies for Microelectronics and Photonics*, Costa Mesa, CA, June 8-9, 2004.
12. Session chair in the conference of *ASME/ITHERM 2006*.
13. Session chair in the conference of *Society of Experimental Mechanics 2006*.
14. Session chair of *InterPACK 2005*.
15. Session chair in the conference of *ASME/ITHERM 2004*.
16. Session chair in the conference of *Society Of Experimental Mechanics 2004*.
17. Session chair in the conference of *'95 American Society for Composites, 1995*.