Junghyun Cho, Ph.D.

Professor of Mechanical Engineering & Materials Science and Engineering

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EDUCATION

08/1994 – 12/1998	Ph.D. in Materials Science and Engineering, *Lehigh University* (01/1999) (Ph.D. Dissertation: *Role of Rare-Earth Dopants on the Improved Creep Properties of Aluminum Oxide*; Committee Members: M. P. Harmer, J. M. Rickman, H. M. Chan, S. M. Wiederhorn)
09/1992 – 12/1993	M.S. in Materials Science and Engineering, *Northwestern University* (12/1993) (M.S. Thesis: *Characterization of Prototype Ni-Co Ultrahigh Strength Steels for Aerospace Applications*; Committee Members: G. B. Olson, M. E. Fine, T. A. Stephenson)
03/1986 – 12/1990	B.S. in Metallurgical Engineering, *Yonsei University*, Seoul, Korea (02/1991) (Senior project: *Effect of Cu-Addition on Aging Characteristics and Mechanical Behavior in Al-Li Binary Alloy*; Advisor: T. Kim)

PROFESSIONAL EXPERIENCE

01/2023 – Present	Associate Dean for Graduate Studies and Faculty Development, Thomas J. Watson School of Engineering and Applied Science, *State University of New York (SUNY) at Binghamton*, USA
10/2018 – 01/2023	Associate Dean for Research and Graduate Studies, Thomas J. Watson School of Engineering and Applied Science, *State University of New York (SUNY) at Binghamton*, USA
09/2013 – Present	Professor, Department of Mechanical Engineering & Materials Science and Engineering Program, *State University of New York (SUNY) at Binghamton*, USA
03/2018 – 07/2018	Visiting Professor, Department of Emerging Materials Science, *Daegu Gyeongbuk Institute of Science and Technology (DGIST)*, Daegu, KOREA
12/2017 – 03/2018	Visiting Professor, Graduate School of Informatics and Engineering, *University of Electro-Communications*, Tokyo, JAPAN
09/2017 – 12/2017	Visiting Professor, Department of Emerging Materials Science, *Daegu Gyeongbuk Institute of Science and Technology (DGIST)*, Daegu, KOREA
01/2010 – 08/2017	Co-Director, Materials Science and Engineering Program, *State University of New York (SUNY) at Binghamton*, USA
06/2011 – 08/2017	Summer Faculty Fellow at *Analog Devices, Inc.*, Wilmington, MA, USA
02/2009 – 01/2010	Visiting Professor, Department of Metallurgy & Ceramics Science, *Tokyo Institute of Technology*, JAPAN
09/2007 – 08/2013	Associate Professor, Department of Mechanical Engineering & Materials Science and Engineering Program, *State University of New York (SUNY) at Binghamton*, USA
06/2006 – 08/2013	Director of Graduate Studies, Department of Mechanical Engineering & Materials Engineering Program, *State University of New York (SUNY) at Binghamton*, USA
09/2001 – 08/2007	Assistant Professor, Department of Mechanical Engineering & Materials Science and Engineering Program, *State University of New York (SUNY) at Binghamton*, USA

07/1999 – 08/2001	Postdoctoral Researcher, Materials Department, *Univ. of California, Santa Barbara*, CA, USA
01/1999 - 06/1999	Postdoctoral Researcher, Department of Materials Science and Engineering, *Lehigh University*, Bethlehem, PA, USA
12/1990 - 09/1991	R&D Engineer, *Samsung Electronics* (Semiconductor R&D Center), Kiheung, Kyungki-do, KOREA

HONORS/AWARDS

- Japan Society for the Promotion of Science (JSPS) Invitational Fellowship for Research in Japan (12/2017-2/2018)
- Invitational Fellowship from *University of Electro-Communications – Tokyo*, JAPAN (1/2016 & 2/2018-3/2018)
- Summer Faculty Fellowship awarded from Analog Devices, Inc. (2011-2017)
- NASA Tech Brief Certificate (LEW-19005-1) (2013)
- NSF Planning Visits Award to visit Japan (2009-2010)
- Outstanding Technical Paper Award of International Conference of Electronics Packaging (ICEP2009, Kyoto, JAPAN) (2009).
- Materials and Structures Laboratory (MSL) Collaborative Research Award by Tokyo Institute of Technology (2009)
- Binghamton University UUP Individual Development Award (2008, 2009, 2015, 2016, 2019)
- NYSTAR Technology Transfer Incentive Program Award (May 2006)
- SUNY Chancellor's Inventors Award (May 2003)
- Materials Research Poster Prize (1st place) at the International Symposium on Solid State Ionics (Lehigh University, April 1999)
- Rowland B. Snow Award by the American Ceramic Society (1999)
- Best Graduate Student Poster Award presented by the Ceramic Educational Council, 100th Annual Meeting of American Ceramic Society (1998)
- Gotshall Fellowship Award (1997-1998)

RESEARCH EXPERIENCES & INTERESTS

My research interests lie in the field of materials and mechanics in order to design enabling materials for real-world applications, as well as to tackle various engineering problems encountered as a result of materials failure. In particular, my group seeks to gain a fundamental understanding of *microstructure and properties of materials to establish their relationships for desirable performance*. Bulk, surface, and interface structures derived from ceramics, metals, and polymers and their hybrid arrangements are investigated for applications such as high temperature devices, microelectronics, semiconductors, flexible devices, photocatalytic and photoelectric surfaces, antimicrobial coatings, and renewable and alternative energy fields.

(Ceramics)

- Processing science and microstructure design of ceramic thin films, bulk ceramics, and hybrid materials; microstructure-property relationships
- Material characterizations via high-resolution and analytical instruments
- Low-temperature, solution-based processing of nanostructured oxide films and nanoparticles (TiO_2, ZrO_2, SnO_2, ZnO, SiO_2, $BaTiO_3$); hydrothermal processing of oxides; thermodynamics-based modeling of solution processing
- Biomimetic synthesis; template-directed nucleation and growth of ceramic materials; self-assembly and self-organization of materials
- Thermal barrier coatings (TBC) (e.g., yttria-stabilized zirconia) for turbine engines
- High-temperature, creep-resistant ceramics (Al_2O_3, YAG, Si_3N_4) and ceramic composites
- Atomistic simulation and modeling (Monte Carlo methods, lattice models, energy minimization, atomic ballistic deposition)

(Metals and alloys; intermetallics)

- Solder alloy designs and developments: Pb-free solders, high melting point (HMP) solders

- Joining and bonding technologies: transient liquid phase (TLP) bonding, sintered silver, Cu-to-Cu bonding, oxide-to-oxide bonding
- Oxidation of metals (indium, tin, copper, solders)
- Mechanics and mechanical properties of materials at different length scales (tensile, compression, bending, creep, nanoindentation)
- Alloy design through Thermo-Calc (thermodynamics-based software package and databases for calculation of phase diagrams)
- Microstructure and mechanical behavior of steels and ultrahigh strength (UHS) steels

(Applied research in microelectronics, flexible devices & energy fields)

- Reliability issues in electronic, photonic and MEMS packaging: polymeric materials, ceramic materials, metallization, interfacial adhesion and reactions, mechanical properties
- Packaging interconnect methods: solder, wire bond, 3D packaging, Cu-to-Cu direct bond (CuDB) and hybrid bond for 3D interconnects, micropillars, TLP bond
- Protective coatings; barrier coatings; conformal coatings (parylene C, polyurethane, polyurethane acrylate, nanoparticle-filled polymers)
- Electrical properties of oxide thin films: high-*k* dielectrics, low-*k* dielectrics, embedded capacitors, TFT, TCO
- Oxide nanostructures and thin films for renewable and alternative energy fields (photovoltaic films, solar cells)
- Structural and mechanical analyses of electronic packaging components (through experiments and computer modeling)

RESEARCH CAPABILITIES / INSTRUMENTS

(Cho's Lab – Advanced Materials and Mechanics Lab (AMML))

- Synthesis and processing of materials: wet-processing equipment, glovebox (< 1% ppm H_2O, < 1 ppm O_2, 0-10% H_2), spin-coater, temperature chambers, ovens, and high-temperature furnace (1700˚C max)
- Denton Desktop Pro DC/RF sputtering system (with 2 target sources)
- Harrick plasma cleaner with a gas control (air, Ar, O_2)
- Nano-Mechanical testing: Hysitron TrioboIndenter with heating/cooling stage (-10 to 200˚C), dynamic nanoindentation, and feedback control
- Wilson Tukon 1102 Micro Hardness Tester
- Two MTS mechanical testers (with temperature chamber and fluid chamber) and one low-force Instron tester: tensile testing, creep testing, fatigue testing, bending testing, fracture toughness testing
- Absorption spectroscopic tools for structural and chemical analyses: FT-IR (PerkinElmer Spectrum 100R), UV-Vis-NIR spectrophotometer (PerkinElmer Lambda 950)
- Integrated Scanning Probe – Raman Microscope (AFM from NT-MDT, Raman spectroscopy from Renishaw) *funding made through the NSF-MRI Program
- Dynamic light scattering for nanoparticle analyses in solution (Malvern Zetasizer Nano-ZS)
- Contact angle meter (hydrophilicity/hydrophobicity)
- Optical microscopes: Zeiss Axio Imager M1m with motorized X, Y, and Z, Nikon Epiphot-TME, Olympus stereomicroscope, imaging analysis software
- Electrical characterization: dielectric measurements at various frequencies from 20 Hz to 2 MHz, I-V curves and semiconductor parameter analyses, all connected to RF/DC probe station (with high temperature chuck that can heat the samples up to 500˚C)
- Specimen preparation laboratory (diamond saw, semi-automatic polisher, TEM cross-sectional tools, (ultra)microtome slicing, vacuum tools, sample mounting, etc.)

- Computational materials science: finite element analysis (ABAQUS, ANSYS), atomistic simulation (kinetic Monte Carlo, energy minimization), aqueous solution processing, Thermo-Calc software (with TCSLD1 solder database), Materials design and selection software (Granta CES EduPack, now ANSYS Granta EduPack)

(Access to Binghamton University Equipment User Facilities)

- Nano/micro-patterning and deposition/etching tools in cleanroom (Nanofabrication Laboratory)
- Surface characterization: AFM, Wyko optical profiler, contact profilometer, XPS (ESCA), ellipsometer
- High-resolution and analytical microscopes: FE-SEM, LaB_6-SEM, TEM/STEM (EDS, EELS, energy Filter, liquid nitrogen cryo transfer holder, *in-situ* heating stage)
- FEI NanoLab Dual-Beam System: Integrated scanning electron microscope (SEM) – focused ion beam (FIB) with advanced imaging and analytical capabilities
- Neocera Pioneer 180 pulsed laser deposition (PLD) system with a RHEED camera and a pulsed electron source
- Crystallography of solids: XRD, EBSD
- Thermal analysis: TGA, TGA-MS, DSC, TMA, DMA
- Leica Cryo Ultramicrotome System

CONTRACT/GRANT ACTIVITIES

- Bonded Separator with Ni Anode Current Collector in Zinc-Air Battery: funded by SPIR/e-Zinc (01/2023 – 08/2023)
- Mechanistic Understanding of the Cu/Oxide Hybrid Bonding: funded by SUNY/IBM AI Research Alliance Program (10/16/2022 – 12/31/2023) *Multi-year project renewed yearly
- Electronic Assembly Solder Alloy Development: funded by Universal Instruments Corporation (6/1/2021 – 8/31/2022)
- Adhesives Characterization: funded by Honeywell Federal Manufacturing & Technologies / US Department of Energy (12/1/2021 – 8/31/2022)
- Conformal Coating Tin Whiskers: funded by Honeywell Federal Manufacturing & Technologies / US Department of Energy (10/1/2018 – 11/30/2021)
- Microstructure Evaluation of New SAC Solders: funded by Analog Devices, Inc. (5/28/2018 – 9/27/2018)
- Electronic Package Interconnects and Materials: funded by Universal Instruments Corporation (7/24/2017 – 8/31/2018)
- Development of Transient Liquid Phase (TLP) Bonding: funded by IEEC (07/01/2016 – 06/30/2018) *Industrial partner: GE Global Research
- The Deep History of Pottery in the American South: funded by TAE Seed Grant Program (Binghamton University) (06/01/2016 – 05/31/2017)
- UV-Curable Polyurethane Coatings with Improved Moisture Barrier Properties: funded by New York State Energy Research and Development Authority (NYSERDA) (07/01/2015 – 05/31/2017) *plus a matching fund, in collaboration with SUNY CNSE, SUNY ESF, and BAE Systems
- Whisker Mitigating Composite Coat: funded by Strategic Environmental Research and Development Program (SERDP) – DOD program in partnership with DOE and EPA (03/2012 – 01/2017)
- Acquisition of an Integrated Scanning Probe-Raman Microscope: funded by NSF-MRI (06/01/2014 – 08/31/2017)
- Materials Characterization in Electronic Packages: funded by Analog Devices, Inc. (09/21/2015 – 09/25/2017)
- Testing and Evaluation of Nano-Scale ZnO Coating for Reduction of Biofilm Formation: funded by NASA-SBIR Phase I (through N2 Biomedical) (07/01/2016-12/01/2016)

- Eutectic Bonding on MEMS Wafer Level Chip Scale Packaging: funded by Analog Devices, Inc. (08/15/14-08/15/2016)
- Developments of Bi Solders and Bi TLP Bonding for High Temperature Electronics: funded by IEEC (07/01/2014 – 06/30/2016) *Industry partner: GE and Universal Instruments
- Pb-Free Die Attach Materials: funded by Universal Instruments Corporation (UIC) (09/01/2015-07/31/2016)
- Materials and Advanced Manufacturing: Green Composite: funded by Research Foundation for SUNY (07/01/2014 – 6/30/2016)
- Hybrid Organic-Inorganic Nanomaterials for Photovoltaic and Piezoelectric Energy Harvesting: funded by TAE Seed Grant Program (06/01/2015-05/31/2016)
- Interconnect Methods in Packaging: funded by Analog Devices, Inc. (09/22/2014 – 09/21/2015)
- Hermetic Sealing through Eutectic Bonding of Al-Ge: funded by Analog Devices, Inc. (08/15/2014 – 08/10/2015)
- High Power Density and High Power Dissipation Packages: funded by Analog Devices, Inc. (09/01/2013 – 6/30/2014)
- High-Bi Alloys for a High Temperature Pb-Free Solder Alternative: funded by Integrated Electronics Engineering Center (07/01/2013 – 06/30/2014) *Industrial partner: GE and Universal Instruments
- IEEC Packaging Materials Database: funded by Integrated Electronics Engineering Center (07/01/2013 – 06/30/2014)
- Investigations on Direct Copper Bonding as Method of Interconnection for Multi-Tier Chip / Wafer Stacking: funded by Sematech (06/2012 – 05/2013)
- Characterization of a Unique Process of Non-Deterministic 3D Printing: funded by SPIR/Seraph Robotics, Inc. (01/2013-05/2013)
- Evaluation of Electronic Packaging Materials and Processes: funded by Analog Devices, Inc. (08/2012-05/2013)
- Pb-Free Solders for High-Temperature Electronics: funded by IEEC (07/01/2012 – 06/30/2013) *Industry partner: GE and Universal Instruments
- Alloy Design and Developments for High-Temperature Solders: funded by IEEC at SUNY Binghamton (07/2011 – 06/2012) *Industry partner: GE
- Development of an Electrical Resistive Coating: funded by SPIR/CPSI Biotech, Inc. (01/2012-05/2012)
- Development of High-*k* Gate Dielectrics for Flexible Electronics: funded by Center for Advanced Microelectronics Manufacturing (CAMM) (07/2010 – 06/2011)
- Packaging Materials Design and Evaluation for High-Temperature Electronics: funded by IEEC at SUNY Binghamton (07/2010-06/2011)
- Enhanced Mica Paper Dielectric: funded by SPIR/Custom Electronics (06/2011-12/2011)
- Hybrid Inorganic-Organic Thin Films for Flexible Solar Cells: funded by Center for Autonomous Solar Power / NASA (01/2010-12/2011)
- U.S-Japan Planning Visit: Collaborations in Functional Ceramic Thin Film Research: funded by NSF (09/2009-08/2010)
- Fabrication of Titania-Coated Photoanodes for Flexible Solar Cells: funded by Center for Advanced Microelectronics Manufacturing (CAMM) (07/2008 – 06/2009)
- Assessing Metallurgical Variables of Plain Carbon Steel Wires Used for Flexible Shafts: funded by Elliott Manufacturing, Binghamton, NY (10/2008 – 09/2009)
- High-k Ceramic Thin Films for Embedded Capacitors: funded by IEEC at SUNY Binghamton (07/2008 – 06/2009)

- Fabrication of Titania-Coated Photoanodes for Flexible Solar Cells: funded by Center for Advanced Microelectronics Manufacturing (CAMM) (07/2008 – 06/2009)
- Development of ZnO-Based Thin Film Transistors (TFT) for Flexible Substrates: funded by Center for Advanced Microelectronics Manufacturing (CAMM) (10/01/07-09/30/08)
- Interface Adhesion between Organic Materials and Leadframes: funded by IEEC at SUNY Binghamton (07/2007-06/30/2008) *Industry partner: Texas Instruments
- Oxygen and Moisture Barrier Coatings for Organic Electronics: CAMM/US Army Research Development & Engineering Command (01/2007 – 01/2008)
- Electronic Packaging Materials for Deep Drilling Technologies: GE/DOE (09/2006 – 09/2007)
- Ceramic Thin Film Embedded Capacitors for Emerging System-in-Packaging (SIP) Concepts: funded by NYSTAR (09/2006 – 08/2008) *plus a matching fund from Endicott Interconnect and SUNY Binghamton
- A Novel Coating Concept for Electronic and MEMS Packaging: funded by Microelectronics Design Center (MDC) (04/2006 – 03/2009) *in collaboration with the SRC project
- Design, Packaging, and Reliability Guideline for S & A Components and Systems: funded by Office of Naval Research (ONR) (01/2005 – 09/2006)
- Utilization of Dynamic Nanoindentation for Soft Materials: funded by IEEC at SUNY Binghamton (07/2006 – 06/2007)
- A Novel Coating Concept for Electronic and MEMS Packaging: funded by Semiconductor Research Corporation (SRC) (09/2003 – 09/2006)
- Measurement of Small-Scale Mechanical Properties by Nanoindentation: funded by IEEC at SUNY Binghamton (07/2005 – 06/2006)
- Integration of Polymers/Plastics Technologies across the Curriculum: funded by NSF (09/2003 – 08/2005) *Additional fund for materials & supplies awarded from Camille & Henry Dreyfus Foundation.
- Development of *In-Situ*, Small-Scale Mechanical Testing Protocols for Microsystem Packaging: funded by IEEC at SUNY Binghamton (07/2004 – 06/2005)
- Elimination of Hermetic Packaging for MEMS Mirrors by Using Protective Ceramic/SAM Bilayer Coatings: funded by Infotonics Technology Center/US DOE (10/2002 – 09/2004) *additional matching from IEEC at Binghamton Univ.
- Mechanical Behavior of Materials in Micro/Nano Dimensions: funded by Univ. of Rochester/ Infotonics Technology Center/NASA (10/2002 – 09/2004)
- Compact Photonic Explorers Consortium: funded by CUNY/Infotonics Technology Center (10/2002 – 09/2004)
- Characterization of Interface Adhesion in Electronic Packaging: funded by IEEC at SUNY Binghamton (07/2003 – 06/2004)
- Tailoring of Stress Development in MEMS Packaging Systems: funded by Analog Devices (09/2002 – 05/2003)
- LEFM-Based Evaluation of Interfacial Toughness in Flip-Chip Packages by a Four-Point Bending Technique: funded by IEEC at SUNY Binghamton (07/2002 – 06/2003)

RESEARCH GROUP

(Current members)

- Graduate Students: Sakurai, S. (for PhD in MSE); S. Al Zerey (for PhD in MSE); J. Gendler (for MS in ME); M. Patel (for MS in MSE)
- Undergraduate Students: J. Lauer (in ME), A. Bennett-Dubin (in Phys)

(Former members)

- Postdoctoral Scholars (4):
  - Wang, L. (PhD 8/07 from Auburn Univ; got a position at Intel)
  - Kim, H. (PhD 2/07 from KAIST, Korea; got a position at Korea Institute of Machinery and Materials)
  - Roy, B. K. (**PhD 8/10** from Binghamton Univ; got a position at 3M)
  - Yu, S. (**PhD 5/12** from Binghamton Univ; got a position at Amazon)
- Graduate Students (16 PhD's and 18 MS's):
  - Chitre, K. (**MS 12/04**; got a position at Bausch & Lomb)
  - Helvaci, F. (**MS 6/04**)
  - Huang, X. (**MS 8/04**; pursued a PhD at Penn St)
  - Walwadkar, S. (**MS 12/04**; got a position at Intel)
  - Yang, Q. (**PhD 7/04**; got a postdoc position at UCSD)
  - Francis, M. (**MS 1/04**; got a position at Lockheed Martin)
  - Lee, H. (**MS 8/06, PhD 12/12**; got a position at LG Electronics)
  - Schoeller, H.** (**MS 12/07, PhD 08/11**; got a position at Universal Instruments Corporation; currently, a Professor at Germanna Community College)
  - Willis, O. (**MS 12/07**; got a position at GE Energy)
  - Zhang, G.* (**PhD 8/08**; got a position at Texas Instruments)
  - Yoo, M. (**MS 5/10**)
  - Roy, B.** (**PhD 8/10**; got a postdoc position at Binghamton Univ; presently at 3M)
  - Anselm, M. (**PhD 5/11**; currently a faculty member at Rochester Institute of Technology)
  - Lee, S. (**MS 5/11**; got a position at LG Electronics)
  - Yu, S. (**PhD 5/12**; got a postdoc position at Binghamton Univ; presently at Amazon)
  - Link, E. (**MS 5/12**)
  - Maganty, S. (**MS 8/12, PhD 5/17;** got a position at Intel, Chandler, AZ)
  - Presser, B. E. (**MS 5/13**)
  - Mallu, A. (**MS 5/16**; got a job at C4V, Binghamton, NY)
  - Sood, F. (**MS 8/16**; got an internship position at Analog Devices, Inc.)
  - Roma, M. P. C. (**PhD 12/16**; got a position at Advanced Battery Concepts)
  - Mallampati, S. (**PhD 5/17**; got a position at GlobalFoundries, Malta, NY; presently at Intel, San Jose, CA)
  - Shim, J. (**PhD 5/17**; got a position at LG Chemical)
  - Espinosa, J. (**MS 5/18**)
  - Dong, F. (**PhD 8/18**; got a position at Exponent)
  - Tao, T. (**PhD 8/18**; got a position at Lam Research)
  - Tobias, R. (**MS 5/15, PhD 5/19**; got a position at Analog Devices, Inc., Wilmington, MA; presently at MACOM, Nashua, NH)
  - Fallahdoost, H. (**PhD 8/21**; got a position at Intel, Hillsboro, OR)
  - Sivakumar, P.* (**PhD 12/21**; got a position at NXP Semiconductors, Austin, TX)
  - Economides, C. (**MS 5/22**; got a position at BAE Systems, Endicott, NY)

  *recipient of the Graduate Student Award for Excellence in Research
  **recipient of the S^3IP Distinguished Dissertation Award

- Undergraduate Students (14):
  - Metchop, L.+ (**BS 5/04** from Binghamton Univ; attended Arizona State University for MS)
  - Wadach, K.* (**BS 5/04** from Binghamton Univ; worked at Lockheed Martin, followed by MBA at Carnegie-Mellon University)
  - Yennamandra, S.* (**BS 5/06** from Cornell Univ)

- Kwak, J.** (**BS 5/05** from Binghamton Univ; attended Binghamton Univ for MS)
- Yoo, M. (**BS 5/08** from Binghamton Univ; attended Binghamton Univ for MS)
- Lee, S. (**BS 5/09**; attended Binghamton Univ for MS)
- Ahmed, A.++ (from Binghamton Univ)
- Tan, M. (**BS 5/09**; attended Cornell Univ for PhD)
- Carloni, J. (**BS 5/12**; attended Cornell Univ for PhD)
- Solares, L. A.* (from Queensborough Community College)
- Caloia, C.* (from St. Francis College)
- Roder, R. W. (**BS 5/15**; attended Carnegie Mellon Univ for MS)
- Mehlman, T. J. +++ (**BS 5/16**; attended Binghamton Univ for MS)
- de los Santos, M. * (from Queensborough Community College)

*sponsored by NSF-REU
**sponsored by NSF-CCLI
+sponsored by McNair Scholars Program
++sponsored by NSF-LSAMP
+++sponsored by S^3IP Undergraduate Research Initiative

TEACHING EXPERIENCE (COURSES TAUGHT)

- Thermodynamics of Materials (**MSE560**, Graduate)
- Scanning Electron Microscope and Microanalysis (**MSE569**, Graduate)
- Mechanical Behavior of Engineering Materials (**ME562**, Graduate)
- Thin Film and Coating Technologies (**MSE563**, Graduate)
- Reactivity of Materials (**MSE566**, Graduate)
- Scientific Communication and Seminars (**MSE 590**, Graduate)
- Materials and Manufacturing Processes (**ME361**, Mechanical Engineering Junior)
- Science of Engineering Materials (**ME362**, Mechanical Engineering Junior) with a Lab (**ME 363**)
- Also, provided several lectures for Fundamentals of Electronics Packaging (**WTSN582**: for "Materials, Interfaces, and Mechanical Properties"), Special Topics: Polymer (**ME/MSE580**: for "Mechanical Behavior of Polymers & Viscoelasticity"), Flexible Electronics (**MSE 583**: for "Low Temperature Processing of Ceramic Thin Films"), and Techniques for Studying Solids (**MSE511**: for "Mechanical Properties & SEM")

PROFESSIONAL AFFILIATIONS

- Sigma Xi, The Scientific Research Society (since 1997)
- American Ceramic Society (since 1996); TMS (since 1996); MRS (since 2001); ASME (since 2003); IMAPS (since 2003)

PROFESSIONAL SERVICES (REVIEWS, PARTICIPATIONS, COLLABORATIONS)

- Has been a Reviewer for
  - Materials Science in Semiconductor Processing
  - Journal of the American Ceramic Society
  - Nature Communications
  - Journal of Materials Research
  - Acta Materialia
  - Canadian Journal of Physics
  - Materials Science and Engineering-B
  - Materials Science and Engineering-C
  - Journal of Applied Physics D

- Applied Physics Letter
- Journal of Electronic Materials
- Journal of Nanomaterials
- Materials Chemistry and Physics
- Industrial & Engineering Chemistry Research
- Journal of Electronic Packaging
- International Journal of Applied Ceramic Technology
- IEEE Transactions on Components, Packaging and Manufacturing Technology
- Microelectronics Reliability
- Journal of Solid State Chemistry
- Materials and Design
- Advances in Polymer Technology
- RSC Advances
- Science of Advanced Materials
- Conference proceedings: MRS (Materials Research Society), ASME (American Society of Mechanical Engineers)

- Participated in panel reviews for
  - U.S. Department of Energy (DOE) proposals (2013)
  - NSF proposals for ENG/CMMI, MPS/DMR, TIP (2014, 2023)
  - SUNY/RF Collaboration Fund proposals (2012, 2013)
- Reviewed research proposals for
  - American Chemical Society (ACS, 2002)
  - National Science Foundation (NSF; since 2003)
  - Natural Science and Engineering Research Council of Canada (NSERC, 2007)
  - Korean Industrial Technology Foundation (2008)
  - U.S. Department of Energy (DOE ARPA-E, 2015)
- Member of the ASME Electronic & Photonic Packaging Division Technical Committee on High Temperature and Harsh Environment Electronics (2015 – 2017)
- Organized the Harsh Environment Electronics sessions at the Electronics Packaging Symposium in 2010, 2011, 2012, 2015 and 2016 (Binghamton, NY; Niscayuna, NY)
- Organized the High Temperature Electronics sessions at the Electronics Packaging Symposium in 2013 and 2014 (Binghamton, NY)
- Session chair for the Third International Conference on the Science and Technology for Advanced Ceramics (STAC-3) (June 2009; Yokohama, Japan)
- Organized the Advanced Materials in Packaging symposium in ASME-IMECE 2008 (Boston, MA) and ASME-IMECE 2007 (Seattle, WA)
- Organized the Interfaces, Adhesion & Mechanical Behavior in Polymer Systems session in ACS-NERM 2006 (Binghamton, NY)
- Participated in the round-robin tests on the creep rupture of silicon nitride conducted by National Institute of Standards and Technology, Gaithersburg, MD in 1995 and 1997
- Organized the 8th Korean-American Scientists and Engineers Association Northeast Regional Conference (Rutgers University, NJ) in 1997
- <u>Academic collaborations</u>: SUNY Polytechnic Institute, University of Rochester, City University of New York, Alfred University, Tokyo Institute of Technology (Japan), University of Electro-communications (Tokyo, Japan), Daegu Gyeongbuk Institute of Science and Technology (Korea), Max Planck Institut für Metallforschung (Stuttgart, Germany), Princeton University (Materials Research Institute)

- National lab collaborations: Oak Ridge National Laboratory (High Temperature Materials Lab), Los Alamos National Laboratory, National Institute of Standards and Technology
- Industry collaborations: Texas Instruments, GE Global Research, Universal Instruments, BAE Systems, Analog Devices, Inc., Sematech, Honeywell FM&T, IBM

UNIVERSITY SERVICES

- Scientific Advisory Council (SAC) member of the SUNY Applied Materials Research Institute (SAMRI) (2019-Present)
- Advisory Board Member of the Watson Strategic Partnership for Industrial Resurgence (SPIR) Program (2019-Present)
- Member of Selection Committee for the Presidential Diversity Postdoctoral Fellowships (2019-2020)
- Chair, Mechanical Engineering Initiating Personnel Committee (IPC) (2016 – 2017, 2018-2020)
- Co-Director of Materials Science and Engineering Program (2010 – 2017)
- Member of University Faculty Senate (2012 – 2014, 2015 – 2017, 2022 – 2024)
- Member of All-University Personnel Committee (AUPC) (2014 – 2016)
- Member of the Watson School Strategic Planning Committee (Spring 2015)
- Director of Graduate Studies in Mechanical Engineering (2006 – 2013)
- Member of Bioengineering Department Chair Search Committee (2012-2013)
- Member of University Graduate Council (2010-present))
- Member of the Strategic Planning Committee (2011-2013)
- Advisory board member of Professional Science Masters (PSM) degree program in Materials Science and Engineering (2011-present)
- Member of Advisory Committee for Scholarship and Research (ACSR) (2010-2011)
- Committee members for graduate students (excluding my students): PhD dissertation committee (14 finished; >14 current); MS thesis committee (5 finished); Outside examiner (3 for Economics, 1 for Systems Science and Industrial Engineering)

SELECTED PRESENTATIONS (over 50 invited talks and lectures)

- Invited lecture at Pb-free Electronics Risk Management (PERM) Council (Meeting #52) at BAE Systems, Endicott, NY (October 25, 2022): *Conformal Coating Strategies for Tin Whisker Mitigation*.
- Invited academic poster presentation at AI Hardware Form, IBM Thomas J. Watson Research Center, Yorktown Heights, NY (October 18, 2022): *Cu/SiO_2 Hybrid Bonding*.
- Invited lecture at IEEE EPS Mid-Hudson Valley (MHV) Mini-Colloquium 2022 on Advanced Technologies for Inter-Chiplet Connectivity, Albany, NY (August 11, 2022): *Bonding Technologies toward Ultra-Fine Pitch 3D Interconnection*.
- Presentation at 2021 TechConnect World Innovation, National Harbor, MD (October 18-20, 2021): *Engineering the 2-Dimensional ZnO Nanoplates for a High Reactive Surface*.
- Lecture at e-Workshop on NNIA-2021, Hamirpur, Himachal Pradesh, India (May 26, 2021): *Hierarchical Organization and Functional Properties of Solution-Grown Nanostructured Ceramic Coatings*.
- Presentation at a Joint Seminar Series between Binghamton University and Vellore Institute of Technology, India, via Zoom (December 10, 2020): *Design of Nanostructured Ceramic Coatings toward Enhanced Functional Properties*.
- Invited talk at Materials Science and Technology (MS&T) 2018, Columbus, OH (October 14-18, 2018): *Transient Liquid Phase Bonding as a High-Temperature Pb-Free Alloy Alternative*.

- Invited talk at 6th International Solvothermal and Hydrothermal Association Conference, Sendai, JAPAN (August 8-12, 2018): *Hydrothermal Processing of Titanium Oxide Nanocomposite Coatings.*
- Presentation at the 68th IEEE Electronic Components and Technology Conference (ECTC), San Diego, CA (May 29 – June 1, 2018): *Effect of the Interlayer Thickness and Alloying on the Reliability of Transient Liquid Phase (TLP) Bonding*.
- Freshman English Lecture at University of Electro-Communications, Tokyo, JAPAN (February 11, 2018): *Materials Science and Engineering at Binghamton University*.
- Mechanical Engineering Department Lectures at University of Electro-Communications, Tokyo, JAPAN (December 18, 2017): *Materials (I): Structure / Mechanical Properties, Materials (II): Applications*.
- Research Seminar at Sogang University, KOREA (November 7, 2017): *Development of Multifunctional Nanostructured Ceramic Coatings.*
- Research Seminar at Korea Institute for Advancement of Technology (KIAT), KOREA (June 26, 2017): *Development of Multi-functional, Nanostructured Ceramic Coatings*.
- Invited talk at Collaborative Conference on Materials Research (CCMR) 2017, Jeju Island, KOREA (June 26-30, 2017): *Nanostructured Ceramic Coatings for Photocatalytic and Antimicrobial Surfaces.*
- Invited talk at 2016 Electronics Packaging Symposium, Binghamton, NY (October 6-7, 2016): *Development of Transient Liquid Phase (TLP) Bonding as a High-Temperature Pb-Free Alternative.*
- Presentation at the Universal Instruments – AREA Consortium Meeting, Binghamton, NY (March 30, 2016): *Exploring Bismuth as a New Pb-Free Alternative for High Temperature Electronics*.
- Presentation at Materials Science & Technology 2015 Conference & Exhibition (MS&T15), Columbus, OH (October 4-8, 2015): *Multifunctional ZnO Nanorod Films Prepared by Low-Temperature Hydrothermal Processing*.
- Presentation at the Universal Instruments – AREA Consortium Meeting, Binghamton, NY (October 14, 2015): *Development of Polyurethane-Based Conformal Coatings for Pb-Free Electronics*.
- Research Seminar at PES University, Bangalore, INDIA (September 9, 2014): *Development of Conformal Coatings Filled with Hard Nanoparticles*.
- Research Seminar at SK Hynix, Icheon, KOREA (July 11, 2014): *Low-Temperature Copper-to-Copper Direct Bonding for 3D Package Interconnection*.
- Presentation at the 64th IEEE Electronic Components and Technology Conference (ECTC), Lake Buena Vista, FL (May 27-30, 2014): *Developments of High-Bi Alloys as a High Temperature Pb-Free Solder*.
- Presentation at the International Conference on Soldering and Reliability (ICSR), Toronto, CANADA (May 13-15, 2014): *Polyurethane Conformal Coatings Filled with Hard Nanoparticles for Tin Whisker Mitigation.*
- Presentation at the 7th International Symposium on Tin Whiskers, Costa Mesa, CA (November 12-13, 2013): *Characterization of Nanoparticle Enhanced Conformal Coatings for Tin Whisker Mitigation*.
- Presentation at the 63rd IEEE Electronic Components and Technology Conference (ECTC), Las Vegas, NV (May 28-31, 2013): *Mechanism of Low-Temperature Copper-to-Copper Direct Bonding for 3D TSV Package Interconnection*.
- Presentation *at* The International Conference on Soldering and Reliability (ICSR), Toronto, CANADA (May 14-16, 2013): *Characterization of Hybrid Conformal Coatings Used for Mitigating Tin Whisker Growth.*
- Invited talk at 2012 International Conference on Flexible and Printed Electronics, Tokyo, JAPAN (September 6-8, 2012): *Nanostructured Ceramic Thin Films by Low-Temperature Solution Processing.*

- Lecture at Analog Devices, Inc. Wilmington, MA (August 2, 2012): *High Melting Point (HMP) Solders: Alloying Effects, Microstructures, and Mechanical Behavior.*
- Research Seminar at Indium Corporation, Clinton, NY (November 10, 2011): *Role of Alloying Elements in High-Temperature Solders.*
- Invited talk at 2011 Electronics Packaging Symposium, Binghamton, NY (October 10-11, 2011): *Role of Alloying Elements in High-Temperature Solders.*
- Lecture at Analog Devices, Inc. Wilmington, MA (August 17, 2011): *Materials Characterization.*
- Research Seminar at Korea University of Technology and Education, KOREA (July 11, 2011): *Nanostructured Ceramic Thin Films for Photovoltaic Devices.*
- Lectures at Interconnect Intermetallics Workshop held at Analog Devices, Inc. Wilmington, MA (June 1-2, 2011): *Thermodynamics and Kinetics & Scanning Electronic Microscope.*
- Research Seminar at University of Texas at Arlington (April 21, 2011): *Low Temperature Processing of Ceramic Thin Films for Electronic Devices.*
- Research Seminar at Changwon National University, Changwon, KOREA (June 29, 2010): *Low Temperature Processing of Oxide Thin Films for Electronic Devices*.
- Research seminar at Osaka Prefecture University, JAPAN (December 14, 2009): *Low-Temperature Solution Processing of Oxide Thin Films: Microstructure Innovation and Related Applications.*
- Invited Lecture at the 24th Soft Solution Process Workshop at Tokyo Institute of Technology, JAPAN (December 2, 2009): *Low-Temperature Aqueous Solution Processing of Oxide Thin Films: Microstructure Innovation and Related Applications*
- Research Seminar at Korea Electric Power Research Institute (KEPRI), KOREA (July 27, 2009): *Processing and Microstructure Innovation for Enabling Ceramic Materials.*
- Research Seminar at Agency for Defense Development (ADD), KOREA (July 27, 2009): *Processing and Microstructure Innovation for Enabling Ceramic Materials.*
- Invited Lecture Series at Hanyang University, KOREA (May 11, 2009): *Nanoscience behind Design of Enabling Ceramic Thin Films.*
- Research Seminar at Tokyo Institute of Technology, JAPAN (April 8, 2009): *Low-Temperature Ceramic Thin Film Processing for Electronic Devices.*
- Research Seminar at Konkuk University, KOREA (February 13, 2009): *Microstructure Design of Ceramic Thin Films through Low-Temperature Aqueous Solution Processing.*
- Invited talk at 33rd International Conference & Exposition on Advanced Ceramics & Composites, Daytona Beach, FL (January 18-23, 2009): *Fabrication of Hybrid Thin Films Fabrication of Hybrid Thin Films Consisting of Ceramic and Polymer Using a Biomimetic Principle*.
- Invited talk at 5th International Conference on Advanced Materials and Processing, Harbin, China (September 2-5, 2008): *Microstructure Design of Ceramic Thin Films through In-Situ Nanoparticle Precipitation and Assembly.*
- Invited talk at 32nd International Conference & Exposition on Advanced Ceramics & Composites, Daytona Beach, FL (January 27-February 1, 2008): *Biomimetic Ceramic Thin Films: In-Situ Nanocrystal Precipitation and Assembly*.
- Academic presentation at USDC 2008 Flexible Electronics & Display, Phoenix, AZ (January 21-24, 2008): *Inorganic-Organic Barrier Coatings for Flexible OLED Applications*.
- Invited talk at IMAPS Garden State Chapter Fall Packaging Symposium on Advanced Packaging for Optical & Electronic Components, Endicott, NY (Oct. 25, 2007): *Ceramic Thin Films for Embedded Capacitors*.
- Poster presentation at the 25th Army Science Conference, Orlando, FL (Nov 27-30, 2006): *Tailoring of Nano- and Microstructure in Biomimetically Synthesized Ceramic Thin Films.*

- Research Seminar at Binghamton Univ. (October 20, 2006): *Biomimetically Synthesized Ceramic Thin Films*.
- Keynote lecture at ASM International Twin Tier Chapter September Meeting, Endicott, NY (September 14, 2004): *A Novel Coating Concept for Electronic and MEMS Packaging*.
- Invited talk at the 133rd TMS Annual Meeting & Exhibition, Charlotte, NC (Mar 15-18, 2004): *SAM-Ceramic Protective Bilayers for MEMS Device Packaging.*
- Research Seminar at Univ. of Rochester (March 5, 2004): *A Better Understanding of Small-Scale Mechanical Behavior of Materials through Nanoindentation and AFM analyses*.
- Research Seminar at Alfred University (March 25, 2004): *A Better Understanding of Small-Scale Mechanical Behavior of Materials through Nanoindentation and AFM analyses*.
- Overview presentation at the IMAPS Optoelectronics Device and Packaging and Materials, Topical Workshop and Exhibition, Bethlehem, PA (Oct 7-10, 2003): *Electronic and MEMS Packaging Research at SUNY Binghamton*.
- Seminar at Analog Devices, Cambridge, MA (Dec 4, 2002): *Microstructural and Micromechanical Design of Materials*.

PATENT / TECHNOLOGY DISCLOSURES (6 issued; 2 pending)

(Issued)

- Junghyun Cho, *Low Temperature, Nanostructured Ceramic Coatings*: patent issued on November 10, 2020 (**U.S. Patent No: 10,828,400 B2**)
- Junghyun Cho, Bahgat Sammakia, Mark D. Poliks, Roy Magnuson, Biplab Kumar Roy, *Embedded Thin Films*: patent issued in August 2018 (**U.S. Patent No. 10,064,283B2**)
- Junghyun Cho, Bahgat Sammakia, Mark D. Poliks, Roy Magnuson, Biplab Kumar Roy, *Embedded Thin Films*: patent issued in November 2014 (**U.S. Patent No. 8,882,983**)
- Junghyun Cho, Scott Oliver, Wayne Jones, and Bahgat Sammakia, *Surface Coating for Electronic Systems*: patent issued in April 2014 (**U.S. Patent No. 8,685,529**)
- Junghyun Cho, Scott Oliver, Wayne Jones, and Bahgat Sammakia, *Method of Manufacturing Surface Coatings for Electronic Systems*: patent issued in April 2012 **(U.S. Patent No. 8,158,201)**
- Junghyun Cho, Scott Oliver, Wayne Jones, and Bahgat Sammakia, *Surface Coatings for Electronic Systems*: patent issued in October 2007 (**U.S. Patent No. 7,282,254**)

(Pending)

- Junghyun Cho, Low Temperature, Nanostructured Ceramic Coatings: patent application filed on July 15, 2021 **(USPTO Appl. No.: US 2021/0213177 A1)**
- Junghyun Cho, Bahgat Sammakia, Mark D. Poliks, Roy Magnuson, and Biplab Kumar Roy, *Ceramic Thin Film Embedded Capacitors*: patent application filed on November 10, 2014 (**USPTO Appl. No.: 14/537,123**)

(Selected Invention Disclosures)

- *Machine Learning (ML) - Based Prediction of Tin Whisker Formation and Penetration Time under Conformal Coatings* (Binghamton Univ, RB-719, filed on September 2022)
- *Laser Markable Translucent Polyurethane-Based Coatings Filled with Silicon Rubber Particles* (Binghamton Univ, RB-679, filed on November 2021)
- *Nano-Ceramic Coatings for Reduction of Biofilm Formation* (NASA, filed on December 2016)
- Bi-Ni Transient Liquid Phase (TLP) Bonding (Binghamton Univ, RB-480, filed on July 2015)
- *Nanoceramic-Polymer Hybrid Coatings* (Binghamton Univ, RB-416, filed on July 2012)
- *High Bi Alloys* (Binghamton Univ, RB-398, filed on March 12, 2012)
- *Porous, Nanostructured Oxide Films for Low-k Dielectrics* (Binghamton Univ, filed on 2006)

- *Conformal Hermetic Coatings for Packaging* (Binghamton Univ, RB-210, filed on June 2005)
- *Parylene - PDMS Bilayer Coatings* (Binghamton Univ, RB-211 filed on June 2005)

PUBLICATION LIST (over 110 papers on book chapters, journal articles, and conference papers)

(Book chapters)

3. J. Cho, "Chapter 3: Application of Nanostructured Metal Oxides and Its Hybrids for Inactivation of Bacteria and Viruses"; in press, in *Multifunctional Hybrid Semiconductor Photocatalyst Nanomaterials: Application on Health, Energy and Environment*, Edited by J. Prakash, J. Cho, B. C. Janegitz, and S. Sun, Springer Nature: New York, 2023.
2. J. Cho and M. P. C. Roma, "Chapter 5: Metallurgical Aspects of Wire Bonds"; pp. 179-204 in *Encyclopedia of Packaging Materials, Processes, and Mechanics, Set 1-Vol.2 (Wire Bonding Technology)*. World Scientific Publishing Company: Singapore, 2019. (DOI: 10.1142/9789811209666_0005)
1. J. Cho, "Ceramic Thin Films: Aqueous Solution Growth Medium"; pp. 857-865 in *Dekker Encyclopedia of Nanoscience and Nanotechnology (3rd Ed)*, Edited by S. E. Lyshevski, CRC Press: New York, 2014. (https://www.taylorfrancis.com/chapters/edit/10.1081/E-ENN3-120050513/ceramic-thin-films-aqueous-solution-growth-medium-junghyun-cho?context=ubx&refId=28c9763d-8339-4736-83e1-1e6984aee77b)

(Journal articles)

58. J. Prakash, S. B. N. Krishna, P. Kumar, V. Kumar, K. S. Ghosh, H. C. Swart, S. Bellucci, and J. Cho, "Recent Advances on Metal Oxide Based Nano-Photocatalysts as Potential Antibacterial and Antiviral Agents," *Catalysts*, **12** [9] 1047 (2022) (DOI: https://doi.org/10.3390/catal12091047)
57. A. Chakraborty, O. Ruzimuradov, R. K. Gupta, J. Cho, and J. Prakash, "TiO_2 Nanoflower Photocatalysts: Synthesis, Modifications and Applications in Wastewater Treatment for Removal of Emerging Organic Pollutants," *Environmental Research*, **212**, 113550, 2022 (DOI: 10.1016/j.envres.2022.113550)
56. S. Mallampati, H. Schoeller, L. Yin, D. Shaddock, and J. Cho, "Influence of Second Phase Particles on Thermal Conductivity of Bi Alloys," IEEE Transactions on Components, Packaging, and Manufacturing Technology," **12** [3] 502-511 (2022) (DOI: 10.1109/TCPMT.2022.3151576)
55. J. Prakash, J. Cho, and Y. K. Mishra, "Photocatalytic TiO_2 Nanomaterials as Potential Antimicrobial and Antiviral Agents: Scope against Blocking the SARS-COV-2 Spread," *Micro and Nano Engineering*, **14**, 100100 (2022) (DOI: 10.1016/j.mne.2021.100100)
54. P. Sivakumar, S. M. Du, M. Selter, I. Ballard, J. Daye, and J. Cho, "Long-term Thermal Aging of Parylene Conformal Coating under High Humidity and Its Effects on Tin Whisker Mitigation," *Polymer Degradation and Stability*, **191**, 109667 (2021) (DOI: 10.1016/j.polymdegradstab.2021.109667)
53. P. Sivakumar, S. M. Du, M. Selter, J. Daye, and J. Cho, "Improved Adhesion of Polyurethane-Based Nanocomposite Coatings to Tin Surface through Silane Coupling Agents," International Journal of Adhesion and Adhesives, **110**, 102948 (2021) (DOI: 10.1016/j.ijadhadh.2021.102948)
52. T. Gupta, S. Samriti, J. Cho, and J. Prakash, "Hydrothermal Synthesis of TiO_2 Nanorods: Formation Chemistry, Growth Mechanism, and Tailoring of Surface Properties for Photocatalytic Activities, *Materials Today Chemistry*, **20**, 100428 (2021) (DOI: 10.1016/j.mtchem.2021.100428)
51. P. Sivakumar, K. O'Donnell, and J. Cho, "Effect of Bismuth and Nickel on the Microstructure Evolution of Sn-Ag-Cu (SAC) – Based Solders," *Materials Today Communications*, **26**, 101787 (2021) (DOI: 10.1016/j.mtcomm.2020.101787)

50. T. Tao, I.-T. Bae, K. B. Woodruff, K. Sauer, and J. Cho, "Hydrothermally-Grown Nanostructured Anatase TiO_2 Coatings Tailored for Photocatalytic and Antibacterial Properties," *Ceramics International*, **45** [17] 23216-23224 (2019) (DOI: 10.1016/j.ceramint.2019.08.017)
49. F. Dong, S. J. Meschter, S. Nozaki, T. Ohshima, T. Makino, and J. Cho, "Effect of Coating Adhesion and Degradation on Tin Whisker Mitigation of Polyurethane-Based Conformal Coatings," *Polymer Degradation and Stability*, **166**, 219-229 (2019) (DOI: 10.1016/j.polymdegradstab.2019.05.019)
48. F. Dong, S. J. Meschter, and J. Cho, "Improved Adhesion of Polyurethane-Based Coatings to Tin Surface," *Journal of Materials Science: Materials in Electronics*, **30** [8] 7268-7279 (2019) (DOI: 10.1007/s10854-019-01040-6)
47. H. Qiu, J. H. Shim, J. Cho, and J. M. Mativetsky, "Nanoscale Insight into Performance Loss Mechanisms in P3HT:ZnO Nanorod Solar Cells," *ACS Applied Energy Materials*, **1** [11] 6172-6180 (2018) (DOI: 10.1021/acsaem.8b01222)
46. R. Sheikhi and J. Cho, "Growth Kinetics of Bismuth Nickel Intermetallics," *Journal of Materials Science: Materials in Electronics*, **29**, 19034-19042 (2018) (DOI: 10.1007/s10854-018-0029-6)
45. H. Qiu, X. Dong, J. H. Shim, J. Cho, and J. M. Mativetsky, "Effective Charge Collection Area during Conductive and Photoconductive Atomic Force Microscopy Measurements," *Applied Physics Letter*, **112**, 263102 (4 pages) (2018) (DOI: 10.1063/1.5035351)
44. H. W. Noh, S. M. Jeong, J. Cho, and J.-I. Hong, "Ultrahigh Photosensitivity of the Polar Surfaces of Single Crystalline ZnO Nanoplates," *Nanoscale*, **10** [15] 6801-6805 (2018) (DOI: 10.1039/C8NR00569A)
43. S. Mallampati, L. Yin, D. Shaddock, H. Schoeller, and J. Cho, "Lead-Free Alternatives for Interconnects in High-Temperature Electronics," *Journal of Electronic Packaging*, **140**, 010906 (7 pages) (2018). (DOI:10.1115/1.4039027)
42. M. P. C. Roma, S. Kudtarkar, O. Kierse, D. Sengupta, and J. Cho, "Aging Studies of Cu-Sn Intermetallics in Cu Micropillars Used in Flip Chip Attachment onto Cu Lead Frames," *Journal of Electronic Materials*, **47** [2] 1694-1704 (2018). (DOI: 10.1007/s11664-017-5872-3)
41. F. Dong, S. Maganty, S. J. Meschter, and J. Cho, "Effects of Curing Conditions on Structural Evolution and Mechanical Properties of UV-Curable Polyurethane Acrylate Coatings," *Progress in Organic Coatings*, **114**, 58-67 (2018) (DOI: 10.1016/j.porgcoat.2017.09.018)
40. J. H. Shim, I.-T. Bae, and J. Cho, "Microstructure Development of Hydrothermally Grown TiO_2 Thin Films with Vertically Aligned Nanorods," *Journal of the American Ceramic Society*, **101**, 50-60 (2018). (DOI: 10.1111/jace.15110)
39. F. Dong, S. Maganty, S. J. Meschter, S. Nozaki, T. Ohshima, T. Makino, and J. Cho, "Electron Beam Irradiation Effect on the Mechanical Properties of Nanosilica-Filled Polyurethane Films," *Polymer Degradation and Stability*, **141**, 45-53 (2017). (DOI: 10.1016/j.polymdegradstab.2017.05.003)
38. H. Schoeller and J. Cho, "Superplasticity from Viscous Flow in High Pb Ternary Alloy," *Materials Science and Engineering A*, **658**, 210-220 (2016). (DOI:10.1016/j.msea.2016.01.094)
37. S. Maganty, M. P. C. Roma, S. J. Meschter, D. Starkey, M. Gomez, D. G. Edwards, A. Ekin, K. Elsken, and J. Cho, "Enhanced Mechanical Properties of Polyurethane Coatings through Nanosilica Addition," *Progress in Organic Coatings*, **90**, 243-251 (2016). (DOI: 10.1016/j.porgcoat.2015.10.016)
36. J. H. Shim and J. Cho, "Hierarchical Organization of TiO_2 Nanostructures in Low Temperature Solution Processes," *Journal of the American Ceramic Society*, **99 [2]**, 431-439 (2016). (DOI: 10.1111/jace.13972)
35. L. Yuan, X. Chen, S. Maganty, J. Cho, C. Ke, and G. Zhou, "Enhancing the Oxidation Resistance of Copper by Using Sandblasted Copper Surfaces," *Applied Surface Science*, **357**, 2160-2168 (2015). (DOI:10.1016/j.apsusc.2015.09.203)
34. J. Cho, S. J. Meschter, S. Maganty, D. Starkey, M. Gomez, D. G. Edwards, A. Ekin, K. Elsken, J. Keeping, P. Snugovsky, J. Kennedy, and M. Romansky, "Polyurethane Conformal Coatings Filled with

Hard Nanoparticles for Tin Whisker Mitigation," *Journal of Surface Mount Technology*, **27** [3] 15-21 (2014).

33. D. J. Clark, V. Senthikumar, C. T. Le, D. L. Weerawarne, B. Shim, J. I. Jang, J. H. Shim, J. Cho, Y. Sim, M.-J. Seong, S. H. Rhim, A. J. Freeman, K.-H. Chung, and Y. S. Kim, "Strong Optical Nonlinearity of CVD-Grown MoS_2 Monolayer as Probed by Wavelength-Dependent Second-Harmonic Generation, *Physical Review B*, **90**, 121409(R) (2014). (DOI: 10.1103/PhysRevB.90.121409)
32. S. Lee, B. K. Roy and J. Cho, "Vertically Aligned ZnO Nanorods Grown by Low-Temperature Solution Processing," *Japanese Journal of Applied Physics*, **52**, 05DA09 (9 pages) (2013). (DOI: 10.7567/JJAP.52.05DA09)
31. N. Cai and J. Cho, Low Temperature Processed SnO_2 Films Using Aqueous Precursor Solutions, *Ceramics International*, **39,** 143-151 (2013). (DOI: 10.1016/j.ceramint.2012.06.002)
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29. B. K. Roy and J. Cho, "Dielectric Properties of Solution-Deposited Crystalline Barium Titanate Thin Films," *Journal of the American Ceramic Society*, **95** [4] 1189-1192 (2012). (DOI: 10.1111/j.1551-2916.2012.05104.x)
28. B. K. Roy, G. Zhang, and J. Cho, "Titanium Oxide Nanoparticles Precipitated from Low-Temperature Aqueous Solutions: III. Thin Film Properties," *Journal of the American Ceramic Society*, **95** [2] 676-683 (2012). (DOI: 10.1111/j.1551-2916.2011.04827.x)
27. S. Yu, J. S. Lee, S. Nozaki, and J. Cho, "Microstructure Developments of F-doped SiO_2 Thin Films Prepared by Liquid Phase Deposition," *Thin Solid Films*, **520**, 1718-1723 (2012). (DOI: 10.1016/j.tsf.2011.08.039)
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24. G. Zhang, B. K. Roy, L. Allard, and J. Cho, "Titanium Oxide Nanoparticles Precipitated from Low-Temperature Aqueous Solutions: II. Thin Film Formation and Microstructure Developments," *Journal of the American Ceramic Society,* **93** [7] 1909-1915 (2010). (https://doi.org/10.1111/j.1551-2916.2010.03678.x)
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20. H. Schoeller, S. Bansal, A. Knobloch, D. Shaddock, and J. Cho, "Microstructure Evolution and the Constitutive Relations of High-Temperature Solders," *Journal of Electronic Materials*, **38** [6] 802-809 (2009). (https://doi.org/10.1007/s11664-009-0767-6)
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14. G. Zhang, J. Y. Howe, D. W. Coffey, D. A. Blom, L. F. Allard, and J. Cho, "A Biomimetic Approach to the Deposition of ZrO_2 Films on Self-Assembled Nanoscale Templates," *Materials Sci. and Eng. C* **26** [8], 1344-50 (2006). (https://doi.org/10.1016/j.msec.2005.08.010)
13. J. Kim, H. Schoeller, J. Cho, and S. Park, "Assessment of Indium Joint Strength," *Electronic Materials Letter*, **2** [3] 167-170 (2006).
12. T. O. Salami, Q. Yang, K. Chitre, S. Zarembo, J. Cho and S. R. J. Oliver, "Toward a Better Understanding of Synthesis and Processing of Ceramic/SAM Bilayer Coatings," *J. Electron. Mater.,* **34** [5], 534-540 (2005). (https://doi.org/10.1007/s11664-005-0062-0)
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