MYUNGKOO KANG, Ph.D.
Assistant Professor
New York State College of Ceramics (Ceramic Engineering Program)
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EDUCATION

1. *B.S. in Materials Science & Engineering*, Seoul National University, Seoul, Korea (Feb 2006)
2. *M.S. in Materials Science & Engineering*, Seoul National University, Seoul, Korea (Feb 2008)
   Thesis: The Hydroxyl-Quenching-Related Photoluminescence Properties of $SnO_2:Eu^{3+}$ Nanoparticles, Advisor: Prof. Byungwoo Park
3. *Ph.D. in Materials Science & Engineering*, University of Michigan, Ann Arbor, MI (May 2014)
   Thesis: Formation and Properties of Metallic Nanoparticles on Compound Semiconductor Surfaces, Advisor: Prof. Rachel S. Goldman

PROFESSIONAL EXPERIENCE

1. *Assistant Professor*, Ceramic Engineering Program, Alfred University (2023 - Present)
2. *Research Scientist*, University of Central Florida (2017 - 2023)
3. *Postdoctoral Research Fellow*, Pennsylvania State University (2014 - 2016)
4. *Graduate Student Research Assistant*, University of Michigan (2008 - 2014)
5. *Graduate Student Instructor*, University of Michigan (2010)
6. *Air Traffic Control Operator*, Republic of Korea Air Force (2002 - 2004)

HONORS, AWARDS, AND SCHOLARSHIPS

1. Karl Schwartzwalder-Professional Achievement in Ceramic Engineering Award (2018).
2. The honorable mention in the ProQuest Distinguished Dissertation Awards for 2014 (2015)
3. The Poster Award Winner in Materials Research Society (MRS) Meeting (2010)
4. The best award for research presentation in the University of Michigan's Electron Microscopy Analysis Laboratory (EMAL) 40th Anniversary Symposium (2009)
5. The 3rd prize for the presentation in Samsung LCD Business Division internship (2005)
6. The 33rd Annual United Service Organization Six Star Salute (2004)
7. Seoul National University Alumni Association Scholarship (2002)
8. Full scholarships awarded by Seoul National University (1999, 2000, 2001, 2004, and 2005)
9. The third prize at 25th Seoul Science Contest (1997)

RESEARCH GRANTS

***Under Review*:**

1. *Title*: DMREF: Multi-Scale Modeling-Guided *In-Situ* Metrology for the Production of Gradient Refractive Index Chalcogenide Glass-Ceramic Nanocomposites
   Funding Agency: National Science Foundation
   Role: PI (co-PIs: Prof. Collin J. Wilkinson and Prof. Kun Wang at Alfred University; Senior/Key Personnel: Prof. Steve A. Feller at Coe College, Prof. Kathleen A. Richardson and Dr. Rashi Sharma at the University of Central Florida)
   Amount: $1,500,000
   Period: Sep 2025 - Aug 2029

***Granted*:**

2. *Title*: MRI: Acquisition of an In-Situ Infrared Spectroscopic Ellipsometer
   Funding Agency: National Science Foundation
   Role: PI (co-PIs: Prof. S. K. Sundaram and Prof. Mehdi Kabirnajafi at Alfred University)
   Amount: $347,740
   Period: Aug 2024 - Jul 2026
3. *Title*: Fabrication of Scaled-Up Gradient Refractive Index Bulk Glass-Ceramics via Gradient Thermal Treatment
   Funding Agency: Physical Sciences Inc
   Role: co-PI (PI: Dr. Nicholas Kochan at Physical Sciences Inc, co-PI: Prof. S. K. Sundaram at Alfred University)
   Amount: $4,500
   Period: May 2024 - June 2024
4. *Title*: Evaluation of Dual Band IR Gradient Refractive Index Strategies for SWaP Reduction
   Funding Agency: Defense Advanced Research Project Agency
   Role: co-PI (PI: Prof. Kathleen A. Richardson at the University of Central Florida, co-PIs: Prof. Ilya Mingareev at Florida Institute of Technology, Prof. Douglas Warner at Pennsylvania State University, Prof. Sawyer D. Campbell at Pennsylvania State University, and Prof. Juejun Hu at Massachusetts Institute of Technology)
   Amount: $750,000
   Period: Jun 2024 - Dec 2025
5. *Title*: Phase-change Reconfigurable Optical Wavefront Synthesis System
   Funding Agency: National Science Foundation
   Role: co-PI (PI: Prof. Juejun Hu at Massachusetts Institute of Technology, co-PIs: Prof. S. J. Ben Yoo at the University of California Davis, Prof. Hualiang Zhang at the University of Massachusetts Lowell, Dr. Tian Gu at Massachusetts Institute of Technology, and Dr. Hyung Jung Kim at National Aeronautics and Space Administration)
   Amount: $1,500,000
   Period: Sep 2021 - Aug 2025
6. *Title*: Data Compilation for Gradient Refractive Index Optical Design Study
   Funding Agency: Defense Advanced Research Project Agency
   Role: PI (co-PI: Prof. Kathleen A. Richardson at the University of Central Florida)
   Amount: $50,000
   Period: Jun 2022 - Jan 2023
7. *Title*: Broadband Diffraction Grating for Ultra-Short Pulse Compression
   Funding Agency: Air Force Office of Scientific Research
   Role: Subcontractor (PI & co-PI: Dr. Brad Pindzola & Dr. Matthew Murachver at Triton Systems, Inc.)
   Amount: $30,000
   Period: Nov 2022 - May 2023
8. *Title*: Research Mentorship Program
   Funding Agency: The Office of Research at the University of Central Florida
   Role: co-PI (PI: Prof. Kathleen A. Richardson at the University of Central Florida)
   Amount: $2,000
   Period: Jul 2020 - Jun 2021
9. *Title*: Evaluation of Longwave Infrared GRIN Component

Funding Agency: BAE Systems
Role: co-PI (PI: Prof. Kathleen A. Richardson at the University of Central Florida, co-PI: Prof. Ilya Mingareev at Florida Institute of Technology)
Amount: \$2,000
Period: Jul 2017 - Nov 2018

PEER-REVIEWED JOURNAL PUBLICATIONS

***To be submitted*:**

1. Z. G. Ramsey†, L. Tran†, G. B. J. Sop Tagne, C. J. Cano, P. M. Marrero, D. Wiedeman, R. Sharma, K. A. Richardson, S. A. Feller, K. Wang, and **M. Kang***, "*In-Situ* Metrological Approach to the Realization of Controlled Crystallization in Multicomponent Chalcogenide Glasses," *to be submitted*
2. G. B. J. Sop Tagne, B. M. Triplett, M. Y. Shalaginov, S. Deckoff-Jones, T. S. Karnik, S. Son, M. C. Richardson, C. Rivero-Baleine, J. Hu, T. Gu, K. A. Richardson, and **M. Kang***, "Optical Nonlinearity and Spatial Fidelity in Direct Laser Writing Process," *to be submitted*
3. G. B. J. Sop Tagne, L. Tran, Z. G. Ramsey, P. E. Lynch, C. J. Cano, P. M. Marrero, R. A. Alvarez-Aguirre, D. Wiedeman, R. Sharma, N. S. Kochan, K. A. Richardson, S. Feller, R. S. Welch, C. J. Wilkinson, D. G. Stohr, K. Wang, S. K. Sundaram, and **M. Kang***, "Facile Scalable Manufacturing and Multi-faceted Cross-Correlating Characterization of Bulk Gradient Refractive Index Chalcogenide Materials," *to be submitted*

***Under Review*:**

4. P. E. Lynch†, L. Tran†, E. A. Yamac, G. B. J. Sop Tagne, C. J. Cano, P. M. Marrero, A. J. Phillips, R. S. Welch, D. Wiedeman, R. Sharma, K. A. Richardson, S. Feller, W. LaCourse, S. I. Yaniger, C. J. Wilkinson, and **M. Kang***, "Accelerated Low-Temperature Stabilization of Glasses via Thermo-Ultrasonication," *under review, MRS Bull.*
5. T. J. Loretz*, R. Sharma, A. Zachariou, R. A. Loretz, **M. Kang**, and K. A. Richardson, "A Physics-based Measurement Protocol for Determining the True Glass Transition Temperature of Chalcogenide Glasses by Differential Scanning Calorimetry," *under review*, *J. Non-Cryst. Solids*

***Published*:**

6. C. C. Popescu, K. Aryana, B. Mills, T. W. Lee, L. M. Monier, L. Ranno, J. Xu, B. Sia, K. P. Dao, H.-B. Bae, V. Liberman, S. A. Vitale, **M. Kang**, K. A. Richardson, C. A. Rios Ocampo, D. Calahan, Y. Zhang, W. M. Humphreys, H. J. Kim*, T. Gu, and J. Hu*, "Understanding and circumventing failure mechanisms in chalcogenide optical phase change material $Ge_2Sb_2Se_4Te$," *in press*, *Adv. Opt. Mater.* (2025).
7. R. Alvarez*, A. Zachariou, I. Mingareev, T. J. Loretz, R. Sharma, J. Cook, C. Blanco, M. C. Richardson, A. Howe, P. E. Lynch, G. B. J. Sop Tagne, K. Wang, **M. Kang**, and K. Richardson, "Demonstration of Photothermally-Induced GRIN Profiles in Bulk Chalcogenide GAP-Se Glasses." *Adv. Opt. Mater.* **12**, 2401552 (2024).
8. C. C. Popescu†, K. Aryana†, P. Garud, K. P. Dao, S. Vitale, V. Liberman, H.-B. Bae, T.-W. Lee, **M. Kang**, K. A. Richardson, C. A. R. Ocampo, Y. Zhang, T. Gu, J. Hu, and H. J. Kim*, "Electrically phase-change reconfigurable metasurface transmissive optical filter," *Adv. Mater.* **36**, 2400627 (2024).
9. **M. Kang***, R. Sharma, C. Blanco, D. Wiedeman, Q. Altemose, P. E. Lynch, G. B. J. Sop Tagne, Y. Zhang, M. Y. Shalaginov, C.-C. Popescu, B. M. Triplett, C. Rivero-Baleine, C. M. Schwarz, A. M. Agarwal, T. Gu, J. Hu, and K. A. Richardson, "Solution-Derived Ge-Sb-Se-Te Phase-

Change Chalcogenide Films," *Sci. Rep*. **14**, 18151 (2024).

10. **M. Kang***, B.-U. Sohn, Q. Du, D. Ma, R. Pujari, L. Sisken, C. Blanco, C. Goncalves, C. Arias, A. Yadav, A. Zachariou, P. E. Lynch, J. Lee, S. Novak, C. M. Schwarz, I. Luzinov, J. Hu, A. M. Agarwal, D. T. H. Tan, and K. A. Richardson, "Self-Healing Mechanisms for Ge-Sb-S Chalcogenide Glasses Upon Gamma Irradiation," *MRS Bull.* **49**, 778 (2024).
11. **M. Kang†***, B. M. Triplett†, M. Y. Shalaginov†, S. Deckoff-Jones, C. Blanco, M. Truman, E. V. Shirshneva-Vashchenko, J. Cook, T. S. Karnik, Q. Du, C.-C. Popescu, A. Zachariou, Y. Zhang, C. M. Schwarz, S. An, C. Fowler, H. Zhang, I. Divliansky, L. B. Glebov, M. C. Richardson, A. M. Agarwal, C. Rivero-Baleine, J. Hu, T. Gu*, and K. A. Richardson, "Photochemically-Patterned Large-Area Arsenic Sulfide Micro-Gratings for Hybrid Diffractive-Refractive Platforms," *Adv. Photonics Res.* **5**, 2300241 (2024). **[†: Equal contribution]**
12. C.-C. Popescu, K. P. Dao, L. Ranno, B. Mills, L. Martin, Y. Zhang, D. Bono. B. Neltner, T. Gu, J. Hu*, K. Aryana, H. J. Kim*, S. Vitale, P. Miller, C. Roberts, S. Geiger, D. Callahan, M. Moebius, **M. Kang**, K. Richardson, and C. Rios, "An Open-Source Multi-functional Testing Platform for Optical Phase Change Materials," *Small Sci.* **3**, 2300098 (2023).
13. B. Butkus, A. Kostogiannes, A. Howe, **M. Kang**, R. Gaume, K. A. Richardson, and P. Banerjee*, "Zinc Sulfide CVD Optical Ceramic Analyzed by XPS," *Solid State Sci.* **30**, 024019 (2023).
14. P. Prabhathan, K. V. Sreekanth, J. Teng, J. H. Ko, Y. J. Yoo, H.-H. Jeong, Y. Lee, S. Zhang, T. Cao, C.-C. Popescu, B. Mills, T. Gu, Z. Fang, R. Chen, H. Tong, Y. Wang, Q. He, Y. Lu, Z. Liu, H. Yu, A. Mandal, Y. Cui, A. S. Ansari, V. Bhingardive, **M. Kang**, C. K. Lai, M. Merklein, M. J. Müller, Y. M. Song, Z. Tian, J. Hu, M. Losurdo, A. Majumdar, X. Miao, X. Chen, B. Gholipour, K. A. Richardson, B. J Eggleton, K. Sharda*, M. Wuttig*, and R. Singh*, "A Roadmap for Phase Change Materials in Photonics and Beyond", *iScience* **26**, 107946 (2023). **[Invited as part of a keynote article entitled "PCM Photonics Roadmap 2023" in a special topical issue entitled "Phase Change Materials for Photonics"]**
15. J. Meng, Y. Gui, B. M. Nouri, G. Comanescu, X. Ma, Y. Zhang, C. C. Popescu, **M. Kang**, M. Miscuglio, N. Peserico, K. Richardson, J. Hu, H. Dalir, and V. J. Sorger*, "Electrical Programmable Multi-Level Non-volatile Photonic Random-Access Memory," *Light Sci. Appl.* **12**, 189 (2023).
16. B. Butkus, M. Havel, A. Kostogiannes, A. Howe, **M. Kang**, R. Gaume, K. A. Richardson, and P. Banerjee*, "Calcium Sulfide Powder Analyzed by XPS," *Solid State Sci.* **30**, 014005 (2023).
17. B. Butkus, M. Havel, A. Kostogiannes, A. Howe, **M. Kang**, R. Gaume, K. A. Richardson, and P. Banerjee*, "Lanthanum Sulfide Powder Analyzed by XPS", *Solid State Sci.* **30**, 014001 (2023).
18. M. Havel*, A. Kostogiannes, W. T. Shoulders, V. Blair, D. McGill, C. Rivero-Baleine, R. Bunijevac, J. Eichler, M. R. Kincer, **M. Kang**, K. A. Richardson, and R. Gaume, "Monitoring sulfur loss in polycrystalline solid solutions of CaS-La_2S_3 by Raman spectroscopy and x-ray diffraction," *Opt. Mater. Express* **13**, 504 (2023).
19. C. Rios*, Q. Du, Y. Zhang, C. C. Popescu, M. Shalaginov, P. Miller, C. Roberts, **M. Kang**, K. A. Richardson, T. Gu, S. Vitale, and J. Hu*, "Ultra-compact nonvolatile phase shifter based on electrically reprogrammable transparent phase change materials," *PhotoniX* **3**, 1 (2022).
20. A. Kostogiannes, R. Sharma, A. Howe, M. Chazot, **M. Kang**, J. Cook, K. Schepler, and K. Richardson*, "The role of powder handling on resulting impurities in ZnSe-doped As-S-Se composite materials," *Opt. Mater. Express* **12**, 4287 (2022).

21. S. Vitale*, P. Miller, P. Robinson, C. Roberts, V. Liberman, C. Rios, Q. Du, Y. Zhang, C. C. Popescu, M. Y. Shalaginov, **M. Kang**, K. A. Richardson, and J. Hu, "Phase Transformation and Switching Behavior of Magnetron Plasma Sputtered $Ge_2Sb_2Se_4Te$," *Adv. Photonics Res.* **3**, 2200202 (2022).
22. P. S. Shirshnev*, **M. Kang**, I. Divliansky, K. A. Richardson, and L. B. Glebov, "Engineered refractive and diffractive optical composites via photo-thermal processes," *Opt. Mater. Express* **12**, 3429 (2022). [Invited article in a special topical issue entitled "Celebrating Optical Glass: The International Year of Glass 2022"]
23. F. Yang†, H.-I. Lin†, M. Y. Shalaginov†, K. Stoll, S. An, C. Rivero-Baleine, **M. Kang**, A. Agarwal, K. Richardson, H. Zhang, J. Hu*, and T. Gu*, "Reconfigurable parfocal zoom metalens," *Adv. Opt. Mater.* **10**, 2200721 (2022).
24. L. Karam, R. Alvarado, F. Calzavara, R. Dahmani, **M. Kang**, C. Blanco, F. Adamietz, K. Richardson, and M. Dussauze*, "Spatially microstructured topology of chalcogenide glasses by a combination of the electrothermal process and selective etching for functional infrared media," *Opt. Mater. Express* **12**, 1920 (2022).
25. S. An, B. Zheng, M. Y. Shalaginov, H. Tang, H. Li, L. Zhou, Y. Dong, M. Haerinia, A. M. Agarwal, C. Rivero-Baleine, **M. Kang**, K. A. Richardson, T. Gu, J. Hu, C. Fowler, and H. Zhang*, "Deep Convolutional Neural Networks to Predict Mutual Coupling Effects in Metasurfaces," *Adv. Opt. Mater.* **10**, 2102113 (2022).
26. M. Chazot, A. Kostogiannes, M. Julian, C. Feit, J Sosa, **M. Kang**, C. Blanco, J. Cook, V. Rodriguez, F. Adamietz, D. Verreault, P. Banerjee, K. Schepler, M. C. Richardson, and K. A. Richardson*, "Enhancement of ZnSe stability during optical composite processing via atomic layer deposition," *J. Non-Cryst. Solids* **576**, 121259 (2022).
27. Y. Zhang*, Q. Zhang, C. Rios, M. Shalaginov, J. B. Chou, C. Roberts, P. Miller, P. Robinson, V. Liberman, S. Vitale, **M. Kang**, K. Richardson, T. Gu, and J. Hu, "Transient tap coupler for wafer-level photonic testing based on optical phase change materials," *ACS Photonics* **8**, 1903 (2021).
28. Y. Zhang, C. Fowler, J. Liang, B. Azhar, M. Y. Shalaginov, S. An, J. B. Chou, C. M. Roberts, V. Liberman, **M. Kang**, C. Rios, K. Richardson, C. Rivero-Baleine, T. Gu, H. Zhang*, and J. Hu*, "Electrically Reconfigurable Nonvolatile Metasurface Using Low-Loss Optical Phase Change Material," *Nat. Nanotech.* **10**, 1038 (2021).
29. **M. Kang**†, I. Martin†, R. Sharma, C. Blanco, S. Antonov, T. J. Prosa, D. J. Larson, H. Francois-Saint-Cyr*, and K. A. Richardson*, "Unveiling True 3-D Nanoscale Microstructural Evolution in Chalcogenide Nanocomposites: a Roadmap for Advanced Infrared Functionality," *Adv. Opt. Mater.* **9**, 2002092 (2021). **[†: Equal contribution]**
30. M. Y. Shalaginov†, S. An†, Y. Zhang, F. Yang, P. Su, V. Liberman, J. B. Chou, C. M. Roberts, **M. Kang**, C. Rios, Q. Du, C. Fowler, A. Agarwal, K. Richardson, C. Rivero-Baleine, H. Zhang*, J. Hu*, and T. Gu*, "Reconfigurable all-dielectric metalens with diffraction-limited performance," *Nat. Commun.* **12**, 1225 (2021). [†: Equal contribution]
31. C. M. Schwarz*, S. M. Kuebler, C. Rivero-Baleine, B. Triplett, **M. Kang**, Q. Altemose, C. Blanco, K. A. Richardson, Q. Du, S. Deckoff-Jones, J. Hu, Y. Zhang, Y. Pan, and C. Rios, "Structurally and morphologically engineered chalcogenide materials for optical and photonic devices," *J. Opt. Microsyst.* **1**, 013502 (2021).
32. S. An, B. Zheng, H. Tang, M. Y. Shalaginov, L. Zhou, H. Li, **M. Kang**, K. A. Richardson, T. Gu, J. Hu, C. Fowler*, and H. Zhang*, "Multifunctional Metasurface Design with a Generative Adversarial Network," *Adv. Opt. Mater.* **9**, 2001433 (2021). **[Back cover]**

33. M. A. A. Chazot*, C. Arias, **M. Kang**, C. Blanco, A. Kostogiannes, J. Cook, A. Yadav, V. Rodriguez, F. Adamietz, D. Verreault, S. Danto, T. Loretz, A. Seddon, D. Furniss, K.Schepler, M. C. Richardson, and K. Richardson, "Investigation of ZnSe dissolution in chalcogenide glasses as a route toward the realization of mid-wave infrared fiber laser," *J. Non-Cryst. Solids* **555**, 120619 (2021).
34. C. Rios*, Y. Zhang, M. Shalaginov, S. Deckoff-Jones, H. Wang, S. An, H. Zhang, **M. Kang**, K. A. Richardson, C. Roberts, J. Chou, V. Liberman, S. Vitale, J. Kong, T. Gu, and J. Hu*, "Multi-level Electro-thermal Switching of Optical Phase-Change Materials Using Graphene," *Adv. Photon. Res.* **2**, 2000034 (2021).
35. S. An, B. Zheng, M. Y. Shalaginov H. Tang, H. Li, L. Zhou, J. Ding, A. M. Agarwal, C. Rivero-Baleine, **M. Kang**, K. A. Richardson, T. Gu, J. Hu, C. Fowler*, and H. Zhang*, "A Deep Learning Modeling Approach for Metasurfaces with High Degrees of Freedom," *Opt. Express* **28**, 31932 (2020).
36. A. Yadav*, **M. Kang**, C. Goncalves, C. Blanco, R. Sharma, and K. Richardson, "Impact of raw material surface oxide removal on dual band infrared optical properties of As_2Se_3 chalcogenide glass," *Opt. Mater. Express* **10**, 2274 (2020).
37. L. Karam, F. Adamietz, D. Michau, C. Goncalves, **M. Kang**, R. Sharma, G. S. Murugan, T. Cardinal, E. Fargin, V. Rodriguez, K. A. Richardson, and M. Dussauze*, "Electrically polarized amorphous sodo-niobate film competing with crystalline lithium niobite second order optical response," *Adv. Opt. Mater.* **8**, 2000202 (2020).
38. K. Richardson*, **M. Kang***, L. Sisken, A. Yadav, S. Novak, A. Lepicard, I. Martin, H. Francois-Saint-Cyr, C. M. Schwarz, T. S. Mayer, C. Rivero-Baleine, A. J. Yee, and I. Mingareev, "Advances in infrared GRIN materials: a review," *Opt. Eng.* **59**, 112602 (2020). **[*: Co-corresponding authors, Invited review article in a special topical issue entitled "Advances in Gradient Index Optics Technology"]**
39. R. Sharma*, R. Welch, **M. Kang**, C. Goncalves, C. Blanco, A. Buff, V. Fauvel, T. Loretz, C. Rivero-Baleine, and K. A. Richardson, "Impact of morphology and microstructure on the mechanical properties of Ge-As-Pb-Se Glass Ceramics," *Appl. Sci.* **10**, 2836 (2020). [Invited article in a special topical issue entitled "Photonic Glass-Ceramics: Fabrication, Properties and Applications"]
40. **M. Kang**, L. Sisken, C. Lonergan, A. Buff, A. Yadav, C. Goncalves, C. Blanco, P. Wachtel, J. D. Musgraves, A. V. Pogrebnyakov, E. Baleine, C. Rivero-Baleine, T. S. Mayer, C. G. Pantano, and K. A. Richardson*, "Monolithic Chalcogenide Optical Nanocomposites Enable Infrared System Innovation: Gradient Refractive Index (GRIN) Optics," *Adv. Opt. Mater.* **8**, 2000150 (2020). **[Front inside cover, Highlighted in Advanced Science News and a UCF CREOL Department News]**
41. B. Shen, H. Lin, S. S. Azadeh, J. Nojic, **M. Kang**, F. Merget, K. A. Richardson, J. Hu, and J. Witzens*, "Reconfigurable frequency-selective resonance splitting in chalcogenide microring resonators," *ACS Photonics* **7**, 499 (2020).
42. I. Mingareev*, **M. Kang**, M. Truman, J. Qin, G. Yin, J. Hu, C. M. Schwarz, I. B. Murray, M. C. Richardson, and K. A. Richardson, "Spatial Tailoring of the Refractive Index in Infrared Glass-Ceramic Films Enabled by Direct Laser Writing," *Opt. Laser Technol.* **126**, 106058 (2020).
43. C. M. Schwarz*, **M. Kang**, L. Sisken, Q. Altemose, K. Raichle, B. Schnable, C. Grabill, J. Rice, C. G. Pantano, I. Mingareev, C. Rivero-Baleine, K. Richardson, and S. M. Kuebler, "Fabrication and properties of ZnO-Bi_2O_3-B_2O_3 glass-ceramic containing $Bi_2ZnB_2O_7$

nanocrystals," *J. Alloys Compd.* **820**, 153173 (2020).

44. J. R. Rodriguez, Z. Qi, H. Wang, M. Y. Shalaginov, C. Goncalves, **M. Kang**, K. A. Richardson, J. Guerrero, M. G. Moreno, and V. G. Pol*, "$Ge_2Sb_2Se_5$ Glass as High-Capacity Promising Lithium-ion Battery Anode," *Nano Energy* **68**, 104326 (2020).
45. D. McGill*, J. B. Ghozi-Bouvrande, **M. Kang**, M. Dohlen, G. Delaizir, S. Chenu, L. Roumiguier, J. Duclere, K. Richardson, and R. M. Gaume, "Hot-Pressing of Tellurite Glass with a Sacrificial Pressure-Transmitting Medium," *J. Non-Cryst. Solids* **528**, 119713 (2020).
46. **M. Kang** and R. S. Goldman*, "Ion-Irradiation of Compound Semiconductor Surfaces: from Self-Assembled Nanostructures to Plasmonic Crystals," *Appl. Phys. Rev.* **6**, 041307 (2019). **[Invited review article in a special topical issue entitled "Ion beam enabled nanoscale fabrication, surface patterning, and self-assembly", Editor's pick]**
47. Y. Zhang†, J. B. Chou†*, J. Li†, H. Li†, Q. Du, A. Yadav, S. Zhou, M. Y. Shalaginov, Z. Fang, H. Zhong, C. Roberts, P. Robinson, B. Bohlin, C. Rios, H. Lin, **M. Kang**, T. Gu, J. Warner, V. Liberman, K. Richardson, and J. Hu*, "Broadband Transparent Optical Phase Change Materials for High-Performance Nonvolatile Photonics," *Nat. Commun.* **10**, 4279 (2019). [†: Equal contribution]
48. L. Sisken†, **M. Kang**†, J. M. Veras, C. Smith, A. Buff, A. Yadav, D. McClane, C. Blanco, C. Rivero-Baleine, T. S. Mayer, and K. Richardson*, "Infrared Glass Ceramics with Multi-Dispersion and Gradient Refractive Index Attributes," *Adv. Funct. Mater.* **29**, 1902217 (2019). **[†: Equal contribution]**
49. B. -U. Sohn, **M. Kang**, J. Choi, A. M. Agarwal, K. Richardson, and D. T. H. Tan*, "Observation of very high order multi-photon absorption in GeSbS chalcogenide glass" *APL Photonics* **4**, 036102 (2019).
50. A. Yadav, A. Buff, **M. Kang**, L. Sisken, C. Smith, J. Lonergan, C. Blanco, M. Antia, M. Driggers, A. Kirk, C. Rivero-Baleine, T. Mayer, A. Swisher, A. Pogrebnyakov, A. R. Hilton, G. Whaley, T. J. Loretz, A. Yee, G. Schmidt, D. Moore, and K. Richardson*, "Melt size dependent property variation in $GeSe_2$-As_2Se_3-PbSe (GAP-Se) glass ceramics for infrared GRIN applications," *Int. J. Appl. Glass Sci.* **10**, 27 (2019).
51. C. Goncalves†, **M. Kang**†, B. -U. Sohn, G. Yin, J. Hu, D. T. H. Tan, and K. Richardson*, "New Candidate Multicomponent Chalcogenide Glasses for Supercontinuum Generation," *Appl. Sci.* **8**, 2082 (2018). **[†: Equal contribution, Invited review article in a special topical issue entitled "Mid-infrared supercontinuum sources", Feature paper]**
52. **M. Kang**, A. M. Swisher, A. V. Pogrebnyanov, L. Liu, A. Kirk, S. Aiken, L. Sisken, C. Lonergan, J. Cook, T. Malendevych, F. Kompan, I. Divliansky, L. B. Glebov, M. C. Richardson, C. Rivero-Baleine, C. G. Pantano, T. S. Mayer*, and K. Richardson*, "Ultra-low Dispersion Multicomponent Thin Film Chalcogenide Glass for Broadband Gradient Index Optics," *Adv. Mater*. **30**, 1803628 (2018). **[Highlighted in a UCF CREOL Department News]**
53. **M. Kang**†*, L. Sisken†, J. Cook, C. Blanco, M. C. Richardson, I. Mingareev, and K. Richardson, "Refractive Index Patterning of Infrared Glass Ceramics through Laser-Induced Vitrification," *Opt. Mater. Express* **8**, 2722 (2018). **[†: Equal contribution, Invited article in a special topical issue entitled "Optical phase change materials"]**
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BOOK CHAPTERS

1. K. Richardson[†]* and **M. Kang**[†], "Chalcogenide Materials for Mid-Wave Infrared Fiber," *Mid-infrared Fibre Photonics edited by S. Jackson, R. Vallee, and M. Bernier*, Elsevier (2021). *In press* **[[†]: Equal contribution]**
2. **M. Kang**[†]* and K. Richardson[†], "Glasses: Chalcogenides," *Encyclopedia of Materials: Technical Ceramics and Glasses edited by S. Hampshire*, Elsevier (2021). **[[†]: Equal contribution]**
3. I. Mingareev*, F. Weirauch, T. Bonhoff, N. Gehlich, **M. Kang**, K. Richardson, and M. Richardson, "Applications of high-power 2μm thulium fiber lasers in materials processing," *Advances in High-Power Fiber and Diode Laser Engineering edited by I. Divliansky*, Institution of Engineering & Technology (2020).

PRESENTATIONS

1. "Prospect and Challenges of Solution-Derived Ge-Sb-Se-Te Phase-Change Chalcogenide Films," *16ths Pacific Rim Conference on Ceramic and Glass Technology including Glass & Optical Materials Division Meeting (GOMD 2025)*, Vancouver, British Columbia, Canada, May 2025. **[Invited]**
2. "Spatial Fidelity of Laser-Written Three-Dimensional Glass Structures and their Optical Functionalization," *16ths Pacific Rim Conference on Ceramic and Glass Technology including*

Glass & Optical Materials Division Meeting (GOMD 2025), Vancouver, British Columbia, Canada, May 2025. **[Invited]**

3. "Self-Healing Semiconducting Chalcogenide Glasses Upon Gamma Irradiation," *2025 Materials Research Society Spring Meeting,* Seattle, WA, April 2025.
4. "Novel Chalcogenide Glasses that can Curve Light, Self Heal, and Exhibit Permanent Stability," *21st University Conference on Glass*, Alfred, NY, July 2024.
5. "Mechanisms behind the Structural Evolution of Ge-Sb-S Chalcogenide Glasses upon Gamma Irradiation," *2024 Glass & Optical Materials Division Annual Meeting*, Las Vegas, NV, May 2024.
6. "Laser-Based Spatially-Tailorable Fabrication of Optically-Functional Three-Dimensional Chalcogenide Glass Structures," *Pan American Ceramics Congress and Ferroelectrics Meeting of Americas (PACC-FMAs 2024)*, Panama City, Panama, April 2024. **[Invited]**
7. "Photochemically Engineered Large-Area Arsenic Sulfide Micro-Gratings for Hybrid Diffractive-Refractive Infrared Platforms," *4th International Conference on Optics, Photonics and Lasers (OPL 2023)*, Hiroshima, Japan, December 2023.
8. "Irradiation as a Seemingly Destructive but Counterintuitively Constructive Process: The Case Study of Chalcogenides," *Seminar in the Inamori School of Engineering at Alfred University*, Alfred, NY, July 2023. **[Invited]**
9. "Photochemically-Patterned Programmable Large-Area As_2S_3 Chalcogenide Metalayers for Hybrid Refractive-Diffractive Infrared Media", *American Ceramic Society: Glass and Optical Materials Division 2022 Annual Meeting*, Baltimore, MD, May 2022. **[Invited]**
10. "Novel, Scalable, and Energy-Efficient Approaches to the Fabrication and Characterization of Spatially-Tailorable Nanocomposites for Optical Platforms," *Seminar in the Inamori School of Engineering at Alfred University*, Alfred, NY, February 2022. **[Invited]**
11. "Unveiling True Three-Dimensional Microstructural Evolution in Chalcogenide Nanocomposites as a Route to Advanced Infrared Functionality," *14th Pacific Rim Conference on Ceramic and Glass Technology including Glass & Optical Materials Division 2021 Annual Virtual Meeting*, December 2021.
12. "Atomistic Origins behind the Temporal Optical Evolution of Ge-Sb-S Chalcogenide Glasses upon Gamma Irradiation for Use in Extreme Environment," *14th Pacific Rim Conference on Ceramic and Glass Technology including Glass & Optical Materials Division 2021 Annual Virtual Meeting*, December 2021.
13. "Atom Probe Tomography Brings Infrared Gradient Refractive Index Materials One Step Closer to Commercialization" *Virtual guest lecture in CAMECA's Webinars on the FUNdamentals of APT*, November 2021. **[Invited]**
14. "On the Atom Probe-Informed Rational Design of Monolithic Infrared Gradient Refractive Index Chalcogenide Nanocomposite Materials," *Atom Probe Tomography and Microscopy 2020 Virtual Meeting*, November 2020.
15. "Unveiling True Three-Dimensional Microstructural Evolution in Novel Chalcogenide Nanocomposites as a Route to Infrared Gradient Refractive Index Functionality," *Microscopy & Microanalysis 2019 Virtual Meeting*, August 2020.
16. "Photothermally-Induced Ge-As-Pb-Se Chalcogenide Glass-Ceramic Films with Infrared Function towards a Gradient Refractive Index Element" *25th International Congress on Glass*, Boston, MA, June 2019.

17. “Scalable Laser-Written Multicomponent Ge-As-Pb-Se Chalcogenide Glass-Ceramic Films with Mid-and Long-Wave Infrared Optical Function in a Gradient Refractive Index Element” *SPIE Defense+Commercial Sensing*, Baltimore, MD, April 2019.
18. “Refractive Index Patterning of Infrared Glass Ceramics through Laser-Induced Vitrification” *Materials Science & Technology*, Columbus, OH, October 2018. **[Invited, 2018 Karl Schwartzwalder-Professional Achievement in Ceramic Engineering Award Winner Presentation]**
19. “Ultra-low Dispersion Multicomponent Thin Film Chalcogenide Glass for Broadband Gradient Index Optics” *20th University Conference on Glass and Summer School*, University Park, PA, August 2018.
20. “Time-Dependent Microstructural and Optical Evolutions of Ge-Sb-S Chalcogenide Glasses upon Gamma Irradiation for Mid-Infrared Photonics Applications” *American Ceramic Society: Glass and Optical Materials Division Meeting*, San Antonio, TX, May 2018.
21. “Self-Organized Freestanding One-Dimensional Plasmonic Au Nanoparticle Arrays” *Materials Research Society Meeting*, Boston, MA, December 2017.
22. “Exploiting Defect Processes in Chalcogenide Glass Films for Gradient Index Optics Applications” *Materials Research Society Meeting*, Boston, MA, December 2017.
23. “Irradiation-Enabled, Energy-Efficient Fabrication of Next Generation Nanocomposites for Plasmonics and Transmissive Optics,” *Seminar in CREOL, The College of Optics and Photonics at the University of Central Florida*, Orlando, FL, December 2016. **[Invited]**
24. "Novel Multicomponent Chalcogenide Glasses for Manufacturable Gradient Index Lenses," *Materials Research Society Meeting*, Boston, MA, December 2015.
25. “Optical Properties of Focused Ion Beam-Induced Plasmonic Ga Nanoparticle Arrays on Compound Semiconductor Surfaces,” *American Physical Society March Meeting 2013*, Baltimore, ML, March 2013.
26. “Optical Properties of FIB-Fabricated Metallic Nanostructure Arrays on Compound Semiconductor Surfaces,” *16th International Conference on Luminescence*, Ann Arbor, MI, June 2011.
27. “FIB-Assisted Molecular Beam Epitaxy and Optical Properties of Metal-Semiconductor Nanocomposites,” *Materials Research Society Meeting*, Boston, MA, November 2010. **[Awarded best poster presentation]**
28. “FIB-Synthesized Surface Nanostructure Arrays for Negative Index Metamaterials,” *37th Annual Spring Michigan Chapter of the AVS*, Ann Arbor, MI, May 2010.
29. “FIB-Synthesized Surface Nanostructure Arrays for Negative Index Metamaterials,” *Materials Research Society Meeting*, San Francisco, CA, April 2010.
30. “Focused-Ion-Beam-Synthesis of Surface Nanostructure Arrays,” *2010 International Winter School: Beyond Moore’s Law*, Jeju Island, Korea, February 2010.
31. “Focused-Ion-Beam-Synthesis of Surface Nanostructure Arrays,” *37th Conference on the Physics and Chemistry of Surfaces and Interfaces*, Santa Fe, NM, January 2010.
32. “FIB-Synthesized Ga Nanodroplet Arrays for Negative Index Metamaterials,” *Materials Research Society Meeting*, Boston, MA, November 2009.
33. “FIB-Synthesized Nanostructure Arrays for Negative Index Metamaterials,” *Electron Microscopy Analysis Laboratory 40th Year Anniversary Symposium at the University of Michigan*, Ann Arbor, MI, October 2009. **[Awarded best poster presentation]**
34. “Formation and Properties of Focused-Ion Beam Induced Nanostructures,” *Electronic Materials Conference*, University Park, PA, June 2009.

35. "Formation of Nanostructure on Semiconductor Surfaces using Focused-Ion Beams," *36th Annual Spring Michigan Chapter of the AVS*, East Lansing, MI, May 2009.

PATENTS

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2. C. Rivero-Baleine, **M. Kang**, G. Love, and K. A. Richardson, "Optical Aberration Compensation Lens Using Glass-Ceramics and Method of Making," USA 0260830 (August 18, 2022).
3. K. Schepler, K. Richardson, M. Richardson, C. Arias and **M. Kang**, "Optical Nanocomposites for Laser Applications," USA 0079683 (March 12, 2020).
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PRESS RELEASES

1. "*Self-healing chalcogenide glass?*," Laser Focus World, October 2024
   Article: [https://www.laserfocusworld.com/optics/article/55238673/self-healing-chalcogenide-glass]
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10. "*Nanoparticles could spur better LEDs, invisibility cloaks*," Michigan News, July 2017
    [ns.umich.edu/new/releases/24969-nanoparticles-could-spur-better-leds-invisibility-cloaks]

CONFERENCE SESSION CHAIRING

1. "Glass-based Optical Devices" *Glass & Optical Materials Division 2021 Annual Meeting (virtual)*, December 2021.

PROFESSIONAL MEMBERSHIP

The American Ceramics Society (ACerS): Glass & Optical Materials (GOMD), Electronics (EDiv), and Basic Science (BSD) divisions

SERVING AS A REFEREE FOR PAPERS

Reviewed 41 manuscripts submitted to peer-reviewed journals including:

Advanced Optical Materials, *ACS Photonics*, *ACS Applied Nano Materials*, *Journal of Applied Physics*, *Optical Materials Express*, *Journal of the Optical Society of America B*, *Scientific Reports*, *Inorganic Chemistry*, *AIP Advances*, *Journal of Non-Crystalline Solids*, *Optical Materials*, *Applied Sciences*, *Optics Express*, *Applied Optics*, and *Journal of Electronic Materials*.

TEACHING

1. **Ceramic Engineering Program, Alfred University**
   Faculty Instructor (2025 Spring)
   CEMS545 (Characterization of Materials)
2. **Ceramic Engineering Program, Alfred University**
   Faculty Instructor (2024 Fall, 2025 Spring)
   ENGR480 (Senior Thesis)
3. **Ceramic Engineering Program, Alfred University**
   Faculty Instructor (2024 Spring)
   ENGR450 (Independent Study)

SUPERVISION

***Thesis advisor*:**

1. Patrick E. Lynch (Undergraduate, Glass Science, Alfred University): Oct 2023 - Present
2. Gil B. J. Sop Tagne (Undergraduate, MSE, Alfred University): Jan 2024 - Present
3. Lam Tran (Undergraduate, Glass Science, Alfred University): May 2024 - Present

***Thesis committee*:**

4. Amir Ashjari (Ph.D., Glass Science, Alfred University): Oct 2023 - Present
5. Alicia T. Mayville (Ph.D., Glass Science, Alfred University): Mar 2024 - Jul 2024
6. Kathleen Matthies (Ph.D., Glass Science, Alfred University): April 2024 - Present
7. Jessica Lyza (Ph.D., MSE, Alfred University): March 2024 - Present
8. Allena N. Rohde (Master, Corning Inc): Nov 2024 - Present
9. John T. Zaengle (Ph.D., Ceramic Engineering, Alfred University): Nov 2024 - Present
10. Jiao Li (Ph.D., Ceramic Engineering, Alfred University): Jan 2025 - Present
11. Anna Zachariou (Master, Optics & Photonics, Univ. of Central Florida): Sep 2021 - May 2023
12. Quentin Altemose (Undergraduate, Physics, Ursinus College): May 2017 - July 2017

***Supervisor*:**

13. Nicholas B. Fagbote (Undergraduate, Mech. Eng., Alfred University): Feb 2024 - May 2024
14. Zephyr G. Ramsey (Undergraduate, Glass Science, Alfred University): Sep 2024 - Present