

# HONGJOO RHEE

## Professor

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## Associate Director

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August 2023

## EDUCATION

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- **Ph.D., 2005, Chemical Engineering and Materials Science**, Michigan State University, East Lansing, MI
  - *Thesis: Roles of Service Parameters on the Mechanical Behavior of Lead-Free Solder Joints*
- **M.S., 1993, Metallurgical Engineering**, Inha University, Incheon, Republic of Korea
  - *Thesis: A Study on the Preparation and Characterization of Plasma Sprayed Tungsten Carbide Coatings*
- **B.S., 1991, Metallurgical Engineering**, Inha University, Incheon, Republic of Korea

## PROFESSIONAL TRAINING

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- **The Management Development Program**, June 2011  
Harvard Institutes for Higher Education, Graduate School of Education, Harvard University, Cambridge, MA

## WORK EXPERIENCE

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- **Mississippi State University**, Starkville, MS, USA
  - **Professor**, Aug. 2023 – Present, Department of Mechanical Engineering (ME)
  - **Research Coordinator**, Aug. 2023 – Present, ME
  - **Service Coordinator**, Aug. 2022 – May. 2023, ME
  - **Service Director**, Aug. 2021 – May. 2022, ME
  - **Associate Professor**, Aug. 2018 – Aug. 2023, ME
  - **Associate Research Professor**, Jul. 2015 – Aug. 2018, Center for Advanced Vehicular Systems (CAVS)
  - **Associate Director**, Jul. 2010 – Present, CAVS
  - **Assistant Research Professor**, Sep. 2009 – Jun. 2015, CAVS
  - **Post-Doctoral Associate**, Jan. 2006 – Aug. 2009, CAVS
- **Michigan State University**, East Lansing, MI, USA
  - **Research Associate**, May. 2005 – Dec. 2005, Dept. of Mechanical Engineering
  - **Research/Teaching Assistant**, Aug. 2000 – Dec. 2004, Dept. of Materials Science and Engineering
- **Inha University**, Incheon, Republic of Korea
  - **Research Staff**, Sep. 1998 – Aug. 1999, Institute of Advanced Materials
- **Kia Steel Company**, Seoul / Kunsan, Republic of Korea
  - **Assistant Manager**, Jan. 1996 – Sep. 1998, R&D Center for Metallurgy
  - **Research Staff**, Dec. 1992 – Dec. 1995, R&D Center for Metallurgy
- **Inha University**, Incheon, Republic of Korea
  - **Research/Teaching Assistant**, Mar. 1991 – Feb. 1993, Dept. of Metallurgical Engineering

## PUBLICATIONS

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### • Book Chapters

1. W.D. Russell, N.R. Bratton, Y. Paudel, R.D. Moser, Z.B. McClelland, C.D. Barrett, A.L. Oppedal, W.R. Whittington, **H. Rhee**, S. Mujahid, B. Paliwal, S.C. Vogel, H. El Kadiri, "In situ characterization of the effect of twin-microstructure interactions on {10-12} tension and {10-11} contraction twin nucleation, growth and damage in magnesium," *Microstructure-Mechanical Properties and Application of Magnesium Alloys*, Multidisciplinary Digital Publishing Institute, Basel, Switzerland (2022) 55-76.
2. R. Leonard, III, L. Zhang, L. Luskin, J. Loukus, H. El Kadiri, **H. Rhee**, W.R. Whittington, "Improved load duration in split Hopkinson (Kolsky) bar technique using a serpentine type striker bar," *Challenges in Mechanics of Time Dependent Materials*, Volume 2, Springer International Publishing, Berlin, Germany (2021) 45-50.

### • Peer-Reviewed Journal Articles

3. B.C. Stewart, H.R. Doude, S. Mujahid, M.B. Abney, J.E. Edmunson, E.T. Fox, J.M. Jones, C.W. Hill, J.J. Mehan, H. El Kadiri, **H. Rhee\***, "Effects of nickel and manganese on ductile iron utilizing ionic liquid harvested iron and Bosch byproduct carbon," *Acta Astronautica*, 204 (2023) 175-185.
4. M. Patel, Y. Paudel, S. Mujahid, **H. Rhee**, H. El Kadiri, "Self-consistent crystal plasticity modeling of slip-twin interactions in Mg alloys," *Crystals*, 13 (2023) 653-682.
5. Y. Paudel, C.D. Barrett, S. Mujahid, **H. Rhee**, H. El Kadiri, "Micromechanics-based strain energy study of {10-12} twin-band pattern in a three-point-bend Mg alloy," *Journal of Materials Research*, 38 (2023) 461-472.
6. B.C. Stewart, H.R. Doude, S. Mujahid, M.B. Abney, E.T. Fox, J.E. Edmunson, J.J. Mehan, C.R. Henry, P.B. Hall, H. El Kadiri, **H. Rhee\***, "Comparison study of ductile iron produced with Martian regolith harvested iron from ionic liquids and Bosch byproduct carbon for in-situ resource utilization versus commercially available 65-45-12 ductile iron," *Advances in Space Research*, 71 (2023) 2175-2185.
7. S. Rustom, Y. Paudel, S. Mujahid, M. Cagle, P. Anantwar, K. Hazeli, R. Moser, B. Paliwal, **H. Rhee**, H. El Kadiri, C.D. Barrett, "Manufacturing strategies to mitigate deformation twinning in magnesium," *ASME Open Journal of Engineering*, 2 (2023) 021001.
8. I. Kaur, S. Mujahid, Y. Paudel, **H. Rhee**, P. Singh, "Numerical analysis of flow and heat transfer characteristics of lattice-based compact heat sinks," *Journal of Electronic Packaging*, 145 (2023) 031002.
9. D. Van Iderstine, M.S. Cagle, S. Mujahid, Y. Paudel, S.C. Vogel, Z.B. McClelland, R.D. Moser, H. El Kadiri, **H. Rhee\***, "Cyclic intercritical annealing to improve strength-ductility combinations in medium manganese steels," *Materialia*, 26 (2022) 101604.
10. B.C. Stewart, H.R. Doude, S. Mujahid, E.T. Fox, J.E. Edmunson, M.B. Abney, **H. Rhee\***, "Novel selective laser printing via powder bed fusion of ionic liquid harvested iron for Martian additive manufacturing," *Journal of Materials Engineering and Performance*, 31 (2022) 6060-6068.
11. B.C. Stewart, H.R. Doude, T.L. Taylor, M.B. Abney, **H. Rhee\***, "Evaluation of Bosch process-sourced carbon in low-carbon steel and gray iron casting for Martian surface manufacturing," *Journal of Aerospace Engineering*, 35 (2022) 04021134.
12. G.G. Stubblefield, K.A. Fraser, D. Van Iderstine, S. Mujahid, **H. Rhee**, J.B. Jordon, P.G. Allison, "Elucidating the influence of temperature and strain rate on the mechanics of AFS-D through a combined experimental and computational approach," *Journal of Materials Processing Technology*, 305 (2022) 117593.
13. Y. Paudel, D. Giri, M.W. Priddy, C.D. Barrett, K. Inal, M.A. Tschopp, **H. Rhee**, H. El Kadiri, "A review on capturing twin nucleation in crystal plasticity for hexagonal metals," *Metals*, 11 (2021) 1373.
14. B. Paliwal, R.D. Moser, C.D. Barrett, W.R. Whittington, **H. Rhee**, S. Mujahid, Y. Paudel, H. El Kadiri, "Martensitic microstructure evolution in austenitic steel: A thermomechanical polycrystalline phase field study," *Journal of Materials Research*, 36 (2021) 1376-1399.
15. K.L. Johnson, M.W. Trim, Y. Mao, **H. Rhee**, L.N. Williams, J. Liao, J. Griggs, M.F. Horstemeyer, Y. Duan, "Finite element analysis of a ram brain during impact under wet and dry horn conditions," *Journal of the Mechanical Behavior of Biomedical Materials*, 119 (2021) 104400.
16. R. Leonard, III, L. Luskin, L. Zhang, J. Jinkerson, J. Morse, M. Horstemeyer, H. El Kadiri, **H. Rhee**, J. Loukus, W.R. Whittington, "Design consideration for joining of tubular members subjected to impact

- loading,” *Journal of Advanced Joining Processes*, 3 (2021) 100037.
17. N. Lee, P. Berthelson, V. Griffith, M. Garrett, A. Brinda, R. Moser, M. Horstemeyer, **H. Rhee**, R. Prabhu, “Microstructure and nanomechanical properties of the exoskeleton of an ironclad beetle (*Zopherus haldemani*),” *Bioinspiration & Biomimetics*, 16 (2021) 036005.
  18. W.D. Russell, N.R. Bratton, Y. Paudel, R.D. Moser, Z.B. McClelland, C.D. Barrett, A.L. Oppedal, W.R. Whittington, **H. Rhee**, S. Mujahid, B. Paliwal, S.C. Vogel, H. El Kadiri, “In-situ characterization of the effect of twin-microstructure interactions on {10-12} tension and {10-11} contraction twin nucleation, growth and damage in magnesium,” *Metals*, 10 (2020) 1403-1425.
  19. C. Dyar, S. Brauer, W. Williams, H. Doude, W. Whittington, A. Oppedal, H. El Kadiri, M. Tschopp, **H. Rhee\***, “Enhancing mechanical properties of hot wrought steel by microalloying and optimizing heat treatments,” *Journal of Materials Engineering and Performance*, 29 (2020) 5374-5387.
  20. J.D. Paramore, B.G. Butler, M.K. Dustan, **H. Rhee**, H. El Kadiri, W.R. Whittington, S. Mujahid, “The role of microstructure and strain rate on the mechanical behavior of Ti-6Al-4V produced by powder metallurgy,” *International Journal of Refractory Metals and Hard Materials*, 92 (2020) 105268.
  21. Y. Paudel, J. Indeck, K. Hazeli, M.W. Priddy, K. Inal, **H. Rhee**, C.D. Barrett, W.R. Whittington, K.R. Limmer, H. El Kadiri, “Characterization and modeling of {10-12} twin banding in magnesium,” *Acta Materialia*, 183 (2020) 438-451.
  22. I. Aslam, M.I. Baskes, D.E. Dickel, S. Adibi, B. Li, **H. Rhee**, M. Asle Zaeem, M.F. Horstemeyer, “Thermodynamic and kinetic behavior of low-alloy steels: An atomic level study using an Fe-Mn-Si-C modified embedded atom method (MEAM) potential,” *Materialia*, 8 (2019) 100473.
  23. J. Kluss, M. Rostaghi Chalaki, W. Whittington, **H. Rhee**, S. Whittington, A. Yadollahi, “Porcelain insulation – defining the underlying mechanism of failure,” *IET High Voltage*, 4 (2019) 81-88.
  24. S.A. Brauer, W.R. Whittington, **H. Rhee**, P.G. Allison, D.E. Dickel, C.K. Crane, M.F. Horstemeyer, “Stress-state, temperature, and strain rate dependence of vintage ASTM A7 steel,” *Journal of Engineering Materials and Technology*, 141 (2019) 021002.
  25. J. Chen, B. Brazile, R. Prabhu, S.S. Patnaik, R. Bertucci, **H. Rhee**, M.F. Horstemeyer, Y. Hong, L.N. Williams, J. Liao, “Quantitative analysis of tissue damage evolution in porcine liver with interrupted mechanical testing under tension, compression, and shear,” *Journal of Biomechanical Engineering*, 140 (2018) 071010.
  26. J.F. Deang, A.K. Persons, A.L. Oppedal, **H. Rhee**, R.D. Moser, M.F. Horstemeyer, “Structure, property, and function of Sheepshead (*Archosargus probatocephalus*) teeth,” *Archives of Oral Biology*, 89 (2018) 1-8.
  27. R.N. Yellakara, N. Kulkarni, J. Tripathy, A. Bader, J. Roach, J. Principe, H. Doude, **H. Rhee\***, “Development of dual-phase steel using non-peritectic carbon chemistry for thin-slab continuous casting compact strip production (CSP) steel mill,” *Iron & Steel Technology*, October (2017) 84-90.
  28. N. Lee, L.N. Williams, S. Mun, **H. Rhee**, R. Prabhu, K.R. Bhattarai, M.F. Horstemeyer, “Stress wave mitigation at suture interfaces,” *Biomedical Physics & Engineering Express*, 3 (2017) 035025.
  29. S.A. Brauer, W.R. Whittington, K.L. Johnson, B. Li, **H. Rhee**, P.G. Allison, C.K. Crane, M.F. Horstemeyer, “Strain rate and stress state dependence of gray cast iron,” *Journal of Engineering Materials and Technology*, 139 (2017) 021013.
  30. J.F. Deang, P.G. Allison, R. Prabhu, L.N. Williams, **H. Rhee**, W.R. Whittington, E.J. Perkins, S.M. Bruce, M.F. Horstemeyer, “Constitutive behaviour of paddlefish (*Polyodon spathula*) cartilage,” *Bioinspired, Biomimetic and Nanobiomaterials*, 6 (2017) 236-243.
  31. I. Aslam, B. Li, R.L. Martens, J.R. Goodwin, **H. Rhee**, F. Goodwin, “Transmission electron microscopy characterization of the interfacial structure of a galvanized dual-phase steel,” *Materials Characterization*, 120 (2016) 63-68.
  32. N. Lee, M.F. Horstemeyer, R. Prabhu, J. Liao, **H. Rhee**, Y. Hammi, R.D. Moser, L.N. Williams, “The geometric effects of a woodpecker’s hyoid apparatus for stress wave mitigation,” *Bioinspiration & Biomimetics*, 11 (2016) 066004.
  33. J. Clemmer, R. Prabhu, J. Chen, E. Colebeck, L.B. Priddy, M. McCollum, B. Brazile, W. Whittington, J.L. Wardlaw, **H. Rhee**, M.F. Horstemeyer, L.N. Williams, J. Liao, “Experimental observation of high strain rate responses of porcine brain, liver, and tendon,” *Journal of Mechanics in Medicine and Biology*, 16 (2016) 1650032.
  34. **H. Rhee\***, W.R. Whittington, A.L. Oppedal, A.R. Sherif, R.L. King, H.-J. Kim, C. Lee, “Mechanical properties of novel aluminum metal matrix metallic composites: Application to overhead conductors,”

Materials & Design, 88 (2015) 16-21.

35. **H. Rhee\***, M.T. Tucker, W.R. Whittington, M.F. Horstemeyer, H. Lim, "Structure-property responses of bio-inspired synthetic foams at low and high strain rates," *Science and Engineering of Composite Materials* 22 (2015) 365-373.
36. H.-S. Kim, J.-W. Youn, **H. Rhee\***, "Development of combined tube drawing process for straight-type cowl cross bar of automobile," *International Journal of Precision Engineering and Manufacturing*, 15 (2014) 2093-2099.
37. N. Lee, M.F. Horstemeyer, **H. Rhee**, B. Nabors, J. Liao, L.N. Williams, "Hierarchical multiscale structure-property relationships of the red-bellied woodpecker (*Melanerpes carolinus*) beak," *Journal of the Royal Society Interface*, 11 (2014) 20140274.
38. K.L. Johnson, M.W. Trim, M.F. Horstemeyer, N. Lee, L.N. Williams, J. Liao, **H. Rhee**, R. Prabhu, "Geometric effects on stress wave propagation," *Journal of Biomechanical Engineering*, 136 (2014) 021023.
39. W.R. Whittington, A.L. Oppedal, S. Turnage, Y. Hammi, **H. Rhee**, P.G. Allison, C.K. Crane, M.F. Horstemeyer, "Capturing the effects of temperature, strain rate, and stress state on the plasticity and fracture of rolled homogeneous armor (RHA) steel," *Materials Science and Engineering A* 594 (2014) 82-88.
40. E. El-Giar, M. Asle Zaeem, H. El Kadiri, R.S. Florea, **H. Rhee**, Y. Bienvenu, M. Dahmen, T. Malot, M. Cherkaoui, "On laser welding of thin steel sheets," *Science and Technology of Welding and Joining*, 17 (2012) 571-580.
41. R. Damiens, **H. Rhee**, Y. Hwang, S.J. Park, Y. Hammi, H. Lim, M.F. Horstemeyer, "Compressive behavior of a turtle's shell: Experiment, modeling, and simulation," *Journal of the Mechanical Behavior of Biomedical Materials*, 6 (2012) 106-112.
42. S. Kim, S.-G. Kim, M.F. Horstemeyer, **H. Rhee**, "The effects of vanadium on the strength of a bcc Fe  $\Sigma 3(111)[1-10]$  grain boundary," arXiv:1201.5915 (2012).
43. **H. Rhee\***, M.F. Horstemeyer, A. Ramsay, "A study on the structure and mechanical behavior of the *Dasypus novemcinctus* shell," *Materials Science and Engineering C* 31 (2011) 363-369.
44. M.W. Trim, M.F. Hostemeyer, **H. Rhee**, H. El Kadiri, L.N. Williams, J. Liao, K.B. Walters, J. McKittrick, S.J. Park, "The effects of water and microstructure on the mechanical properties of bighorn sheep (*Ovis Canadensis*) horn keratin," *Acta Biomaterialia*, 7 (2011) 1228-1240.
45. **H. Rhee\***, M.F. Horstemeyer, Y. Hwang, H. Lim, H. El Kadiri, W. Trim, "A study on the structure and mechanical behavior of the *Terrapene carolina* carapace: a pathway to design bio-inspired synthetic composites," *Materials Science and Engineering C* 29 (2009) 2333-2339.
46. **H. Rhee\***, K.N. Subramanian, "Roles of imposed cyclic strain amplitude and cyclic strain rate on the stress relaxation behavior of pre-strained eutectic Sn-3.5Ag solder joints," *Soldering and Surface Mount Technology*, 18 (2006) 19-28.
47. **H. Rhee\***, K.N. Subramanian, A. Lee, "Role of imposed cyclic straining on the stress relaxation behavior of eutectic Sn-Ag solder joints," *Journal of Materials Science: Materials in Electronics*, 16 (2005) 169-176.
48. **H. Rhee\***, K.N. Subramanian, A. Lee, J.G. Lee, "Mechanical characterization of Sn-3.5Ag solder joints at various temperatures," *Soldering and Surface Mount Technology*, 15 (2003) 21-26.
49. J.P. Lucas, **H. Rhee**, F. Guo, K.N. Subramanian, "Mechanical properties of intermetallic compounds associated with Pb-free solder joints using nanoindentation," *Journal of Electronic Materials*, 32 (2003) 1375-1383.
50. **H. Rhee\***, K.N. Subramanian, "Effects of pre-strain, rate of pre-strain, and temperature on the stress-relaxation behavior of eutectic Sn-3.5Ag solder joints," *Journal of Electronic Materials*, 32 (2003) 1310-1316.
51. **H. Rhee\***, F. Guo, J.G. Lee, K.C. Chen, K.N. Subramanian, "Effect of intermetallic morphology at metallic particle/solder interface on mechanical properties of Sn-Ag solder joints," *Journal of Electronic Materials*, 32 (2003) 1257-1264.
52. **H. Rhee\***, J.P. Lucas, K.N. Subramanian, "Micromechanical characterization of thermomechanically fatigued lead-free solder joints," *Journal of Materials Science: Materials in Electronics*, 13 (2002) 477-484.
53. **H. Rhee\***, H.S. Kim, S.S. Kim, "A study on the carburization of plasma sprayed WC-12wt%Co coatings," *Journal of the Korean Institute of Metals and Materials*, 33 (1995) 640-646.

- **Peer-Reviewed Conference Papers**

54. W. Lin, Y. Wang, S. Lampkin, W. Philips, S. Prabhakar, R. Smith, L. Whittington, Y. Fan, R. Wolz, W. Whittington, **H. Rhee**, "Hail impact testing of stitched carbon fiber epoxy composite laminates," 35<sup>th</sup> American Society for Composites Technical Conference, ASC, Dayton, OH (2020) 731-745.
55. R. Leonard III, L. Zhang, L. Luskin, J. Loukus, H. El Kadiri, **H. Rhee**, W. Whittington, "Improved load duration in split Hopkinson (Kolsky) bar technique using a serpentine type striker bar," Proceedings of the 2020 annual conference on experimental and applied mechanics, Springer Nature, Cham, Switzerland (2020) 45-50.
56. I. Aslam, B. Li, R. Martens, J. Goodwin, **H. Rhee**, M. Horstemeyer, F. Goodwin, "Site-specific studies on the interfacial structures of galvanized dual phase steels," Proceedings of characterization of minerals, metals, and materials 2016, TMS, Warrendale, PA (2016) 183-192.
57. S. Park, **H. Rhee**, M. Horstemeyer, "Investigation on the compressive behavior of turtle's shell: experiment, modeling, and simulation," Proceedings of biomimetics I symposium, KSME, Seoul, Korea (2010) 15-16.
58. L. Wang, **H. Rhee**, S. Felicelli, A.S. Sabau, J. Berry, "Oxide film and porosity defects in magnesium alloy AZ91," Proceedings of shaping casting: the third international symposium, TMS, Warrendale, PA (2009) 123-130.
59. L. Wang, **H. Rhee**, S. Felicelli, A.S. Sabau, J. Berry, "Interdependence between cooling rate, microstructure, and porosity in Mg alloy AE42," Proceedings of magnesium technology symposium, TMS, Warrendale, PA (2009) 249-253.
60. G. Potirniche, J. Middleton, B. Bain, H. El Kadiri, **H. Rhee**, T.N. Williams, P.T. Wang, M.F. Horstemeyer, "A study of monotonic and cyclic properties of LENS fabricated 4140 and AISI4140 steel alloys," Proceedings of materials processing and manufacturing division symposium, TMS, Warrendale, PA (2007) 129-138.

- **Peer-Reviewed Published Technical Journals**

61. Y.S. Suh, **H. Rhee**, K.T. Lee, H.J. Choi, S.Y. Choi, "The study on the reduction of surface defect of CC bloom," Kia Steel Co. Ltd. Technical Research Report, 14 (1998) 14-31.
62. K.T. Lee, H.J. Choi, **H. Rhee**, Y.S. Suh, "Study on the methods of hydrogen flaking resistance," Kia Steel Co. Ltd. Technical Research Report, 13 (1997) 54-61.
63. H.J. Choi, **H. Rhee**, K.T. Lee, Y.S. Suh, "The study for decreasing macro and micro-segregation in ingot casting," Kia Steel Co. Ltd. Technical Report, 13 (1997) 11-29.
64. **H. Rhee\***, S.W. Boo, Y.O. Lee, "Study on the bolting and nutting materials for low-temperature service," Kia Steel Co. Ltd. Technical Report, 12 (1997) 18-28.
65. S.W. Boo, **H. Rhee**, Y.O. Lee, "X-ray diffraction analysis using high temperature apparatus," Kia Steel Co. Ltd. Technical Report, 11 (1996) 82-88.
66. S.W. Boo, **H. Rhee**, Y.O. Lee, "The effect of Al and N on grain size of carburized steel," Kia Steel Co. Ltd. Technical Report, 11 (1996) 18-28.
67. **H. Rhee\***, S.W. Boo, Y.O. Lee, "Comparison and evaluation on the wear resistance of carburized gear steels for automobiles," Kia Steel Co. Ltd. Technical Report, 10 (1996) 3-11.
68. J.S. Lee, C.H. Han, J.H. Shin, **H. Rhee\***, "Microstructure control of high carbon-chromium bearing steel by hot deformation simulator," Kia Steel Co. Ltd. Technical Report, 9 (1995) 23-32.
69. B.L. Jang, Y.H. Lee, B.C. Kim, J.H. Kim, **H. Rhee\***, "Hot workability of SACM1 (effects of strain rate and temperature on the hot strength)," Kia Steel Co. Ltd. Technical Report, 8 (1995) 65-74.
70. D.Y. Kim, J.W. So, **H. Rhee\***, "A study on the high-performance hot work die steel," Kia Steel Co. Ltd. Technical Report, 7 (1994) 5-17.
71. J.Y. Kim **H. Rhee\***, "Characterization of ion nitriding," Kia Steel Co. Ltd. Technical Report, 6 (1994) 86-95.
72. **H. Rhee\***, "Dynamic thermal/mechanical simulator (Gleeble 1500)," Kia Steel Co. Ltd. Technical Report, 5 (1993) 79-84.

## PRESENTATIONS

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1. D. Van Iderstine, S. Mujahid, Y. Paudel, **H. Rhee**, "Effects of direct resistance heating on recrystallization in cold-worked steels," 2022 DoD Steels Summit, APG, MD, Nov. 15, 2022.
2. Y. Paudel, S. Mujahid, H. El Kadiri, **H. Rhee**, "Incorporation of partitioning effects during martensitic phase transformation in phase field modeling of steels," 2022 DoD Steels Summit, APG, MD, Nov. 15, 2022.
3. B. Stewart, H. Doude, S. Mujahid, M.B. Abney, T. Taylor, J. Mehan, J. Edmunson, E. Fox, C. Henry, P. Hintze, C. Hill, J. Jones, **H. Rhee (Keynote)**, "Study of in-situ resource utilization with ionic liquids harvested iron and Bosch process carbon for Martian surface manufacturing," 17<sup>th</sup> International Symposium on Novel and Nano Materials, Jeju, Republic of Korea, Nov. 15, 2022 (Online).
4. D. Van Iderstine, M. Cagle, S. Mujahid, Y. Paudel, S. Vogel, Z. McClelland, R. Moser, H. El Kadiri, **H. Rhee**, "Effects of cyclic intercritical annealing on retained austenite in medium manganese steels," MS&T 2022 Conference & Exhibition, Pittsburgh, PA, Oct. 11, 2022.
5. A. Rusk, Y. Paudel, R. Cochran, S. Mujahid, M. Pepi, P. Czech, **H. Rhee**, "Crystal plasticity modeling effort to capture microstructural variations in cold sprayed materials," Materials Science & Technology (MS&T) 2022 Conference & Exhibition, Pittsburgh, PA, Oct. 10, 2022.
6. W. Williams, S. Mujahid, S. Brauer, H. Doude, K. Doherty, D. Field, K. Limmer, **H. Rhee**, "Alloy and process modification for reduced hydrogen sensitivity of high hardness steel," The Minerals, Metals & Materials Society (TMS) 2022 Annual Meeting & Exhibition, Anaheim, CA, Mar. 2, 2022.
7. Y. Paudel, R. Cochran, S. Mujahid, K. Considine, **H. Rhee**, "Capturing the effects of grain boundaries and intersplat boundaries on deformation behavior of cold sprayed components," TMS 2022 Annual Meeting & Exhibition, Anaheim, CA, Mar. 2, 2022.
8. B. Stewart, H. Doude, J. Edmunson, E. Fox, **H. Rhee**, "Additive manufacturing of ionic liquids harvested metal for Martian habitation," TMS 2022 Annual Meeting & Exhibition, Anaheim, CA, Mar. 1, 2022.
9. D. Van Iderstine, M. Cagle, Y. Paudel, S. Mujahid, H. El Kadiri, **H. Rhee**, "A novel approach to improve strength-ductility combinations in medium manganese steels," TMS 2022 Annual Meeting & Exhibition, Anaheim, CA, Mar. 1, 2022.
10. W. Williams, H. Doude, D. Wipf, D. Field, K. Limmer, K. Doherty, **H. Rhee**, "Alloy design and process modification for reduced hydrogen embrittlement susceptibility of high hardness steels," 2021 DoD Steel Research Summit (*Virtual*), Nov. 9, 2021.
11. S.A. Brauer, **H. Rhee**, P.G. Allison, C.K. Crane, A.L. Oppedal, M.F. Horstemeyer, "Incorporation of dynamic strain aging into an internal state variable plasticity-damage constitutive framework," 2021 DoD Steel Research Summit (*Virtual*), Nov. 9, 2021.
12. B. Stewart, H. Doude, S. Mujahid, J. Edmunson, E. Fox, M.B. Abney, P. Hintze, J. Mehan, **H. Rhee**, "Investigation of variable manganese and nickel content on ductile iron castings utilizing ionic liquids isolated iron and Bosch carbon," MS&T 2021 Conference & Exhibition (*Virtual*), Oct. 18, 2021.
13. W. Williams, D. Salley, H. Doude, D. Wipf, D. Field, K. Limmer, K. Doherty, **H. Rhee**, "Hydrogen permeability for determining hydrogen embrittlement susceptibility of high hardness steels," The Minerals, Metals & Materials Society (TMS) 2021 Annual Meeting & Exhibition (*Virtual*), Mar. 18, 2021.
14. S. Mujahid, D. Salley, W. Williams, H. Doude, W. Whittington, D. Field, K. Limmer, K. Doherty, **H. Rhee**, "Characterization of hydrogen embrittlement sensitivity of various high hardness steels," TMS 2021 Annual Meeting & Exhibition (*Virtual*), Mar. 18, 2021.
15. B. Stewart, H. Doude, M. Abney, E. Fox, J. Edmunson, **H. Rhee**, "Investigation of ionic liquids isolated iron for ductile iron castings," TMS 2021 Annual Meeting & Exhibition (*Virtual*), Mar. 17, 2021.
16. Y. Paudel, S. Mujahid, **H. Rhee**, H. El Kadiri, "On the study of environment assisted hydrogen embrittlement in ultra-high hardness steel," 2020 DOD Steels Research Summit (*Virtual*), Dec. 16, 2020.
17. D. Van Iderstine, M. Cagle, Y. Paudel, S. Mujahid, **H. Rhee**, H. El Kadiri, "Cyclic intercritical annealing: a novel approach to improve strength-ductility combinations in medium Mn steels," 2020 DOD Steels Research Summit (*Virtual*), Dec. 16, 2020.
18. D. Van Iderstine, M. Cagle, Y. Paudel, **H. Rhee**, H. El Kadiri, "On the study of partitioning effects on retained austenite in quenching and partitioning steel," 2020 DOD Steels Research Summit (*Virtual*), Dec. 16, 2020.
19. W. Lin, Y. Wang, S. Lampkin, W. Phillips, S. Prabhakar, R. Smith, L. Whittington, Y. Fan, R. Wolz, W. Whittington, **H. Rhee**, "Hail impact testing of stitched carbon fiber epoxy composite laminates," American

Society for Composite 35<sup>th</sup> Annual Technical Conference (*Virtual*), Sep. 15, 2020.

20. W. Williams, D. Salley, H. Doude, D. Field, K. Doherty, K. Limmer, **H. Rhee**, "Comparison study on hydrogen embrittlement susceptibility of high hardness steels," The Minerals, Metals & Materials Society (TMS) 2020 Annual Meeting & Exhibition, San Diego, CA, Feb. 27, 2020.
21. M. Cagle, C. Barrett, **H. Rhee**, H. El Kadiri, "3<sup>rd</sup> generation advanced high strength steel through quenching and partitioning process," 2019 DOD Steel Summit, Aberdeen Proving Ground, MD, Nov. 7, 2019.
22. D. Salley, W. Williams, H. Doude, W. Whittington, D. Field, K. Limmer, K. Doherty, **H. Rhee**, "Alloy design and characterization of high hardness grade steels," 2019 DOD Steel Summit, Aberdeen Proving Ground, MD, Nov. 7, 2019.
23. W. Williams, H. Doude, D. Field, K. Doherty, K. Limmer, **H. Rhee**, "Comparison study on the susceptibility of high hardness armors to hydrogen embrittlement," 2019 DOD Steel Summit, Aberdeen Proving Ground, MD, Nov. 7, 2019.
24. R. Leonard, III, J. Maddox, C. Krivanec, H. El Kadiri, **H. Rhee**, P. Allison, W. Whittington, "Strain rate dependency of Mil-A-46100 high hard steel using a Johnson-Cook model," Conference and Exposition on Experimental and Applied Mechanics, Reno, NE, Jun. 6, 2019.
25. B. Stewart, H. Doude, T. Taylor, M. Abney, **H. Rhee**, "A study of an alternative carbon source to improve environmental sustainability in steel production," Materials Science & Technology (MS&T) 2019 Conference & Exhibition, Portland, OR, Oct. 2, 2019.
26. N. Lee, L.N. Williams, S. Mun, **H. Rhee**, R. Prabhu, M.F. Horstemeyer, "Impact damping at suture interfaces," 2018 Materials Research Society (MRS) Fall Meeting & Exhibit, Boston, MA, Nov. 29, 2018.
27. W.R. Williams, H.R. Doude, A.L. Oppedal, W.R. Whittington, **H. Rhee**, "Characterization of microalloyed armor steels produced in small scale," MS&T 2018 Conference & Exhibition, Columbus, OH, Oct. 17, 2018.
28. D. Seely, M.F. Horstemeyer, **H. Rhee**, "The effect of heat treatment on the microstructure of a LENS titanium aluminum vanadium alloy that is functionally graded with boron," MS&T 2018 Conference & Exhibition, Columbus, OH, Oct. 17, 2018.
29. J. Wood, **H. Rhee**, A. McIntosh, M.F. Horstemeyer, M. Murphy, R. Prabhu, "Optimizing the structure-property relationship of shark teeth using bio-inspired design," TMS 2018 Annual Meeting & Exhibition, Phoenix, AZ, Mar. 14, 2018.
30. W. Williams, H. Doude, A. Oppedal, W. Whittington, **H. Rhee**, "Characterization of microalloyed armor steels produced in small scale," 2018 DOD Steel Summit, Bethesda, MD, Oct. 23, 2018.
31. C. Dyar, W. Williams, H. Doude, W. Whittington, A. Oppedal, M. Tschopp, **H. Rhee**, "Characterization of micro-alloyed armor steels manufactured in small scale," MS&T 2017 Conference & Exhibition, Pittsburgh, PA, Oct. 11, 2017.
32. **H. Rhee**, C. Dyar, W. Williams, H. Doude, A. Oppedal, W. Whittington, "Supporting study of transitioning material systems from laboratory to fabrication," The Association for Iron & Steel Technology (AISTech) 2017 Conference & Exposition, Nashville, TN, May 8, 2017.
33. R.N. Yellakara, N. Kulkarni, J. Tripathy, A. Bader, J. Roach, J. Principe, H. Doude, **H. Rhee**, "Development of dual phase steel using non-peritectic carbon chemistry for thin-slab continuous casting compact strip production (CSP) steel mill," AISTech 2017 Conference & Exposition, Nashville, TN, May 9, 2017.
34. H. Doude, D. Tsvetkov, **H. Rhee**, "Effect of cooling rate on compact strip production (CSP) of medium carbon steel," MS&T 2016 Conference & Exhibition, Salt Lake City, UT, Oct. 27, 2016.
35. P. Berthelson, G. Liao, J. Liao, L.N. Williams, **H. Rhee**, X. Deong, M.F. Horstemeyer, R. Prabhu, "A study on the mechanical response of the human head during single-collision car crashes using finite element analysis," 2016 Summer Biomechanics, Bioengineering, and Biotransport Conference (SB<sup>3</sup>C), National Harbor, MD, Jun. 29, 2016.
36. I. Aslam, B. Li, R. Martens, J. Goodwin, **H. Rhee**, M. Horstemeyer, F. Goodwin, "Site-specific studies on the interfacial structures of galvanized dual phase steels," TMS 2016 Conference and Exhibition, Nashville, TN, Feb. 14, 2016.
37. **H. Rhee**, W. Whittington, R. King, H.-J. Kim, C. Lee, "Process-structure-property relations and multiscale modeling of novel metal matrix metallic composites," US-Korea Conference on Science, Technology, and Entrepreneurship (UKC) 2015, Atlanta, GA, Aug. 1, 2015 (*invited*).
38. S.S. Patnaik, T. Szasz, R. Prabhu, **H. Rhee**, M.F. Horstemeyer, J. Liao, L.N. Williams, "Dynamic

- viscoelastic properties of porcine patellar tendon tissue: A study of regional variation and frequency dependent behavior,” 2015 SB<sup>3</sup>C, Snowbird, UT, Jun. 19, 2015.
39. K.A. Brown, A. Desai, Y. Mao, M. Horstemeyer, J. Liao, L. Williams, **H. Rhee**, R. Prabhu, “The effects of the impact of a soccer ball on a human head,” 2015 SB<sup>3</sup>C, Snowbird, UT, Jun. 19, 2015.
  40. A. Lamont, R. Bertucci, Y. Hammi, M. Horstemeyer, J. Liao, **H. Rhee**, L.N. Williams, R. Prabhu, “Biomechanics of human tibia and fibula fracture caused by a mixed martial arts kick,” 2015 SB<sup>3</sup>C, Snowbird, UT, Jun. 19, 2015.
  41. B. Brazile, S.S. Patnaik, S. Lin, X. Shi, S. Liao, R. Prabhu, **H. Rhee**, L.N. Williams, J. Liao, “Biomechanical characterization of porcine skeletal muscle extracellular matrix,” 2015 SB<sup>3</sup>C, Snowbird, UT, Jun. 17, 2015.
  42. J. Hughes, M. Lugo, M. Horstemeyer, **H. Rhee**, “Microstructure-sensitive multistage fatigue modeling of the cyclic behavior of a rolled homogeneous armor class steel weld joint,” TMS 2015 Annual Meeting & Exhibition, Orlando, FL, Mar. 16, 2015.
  43. H. Doude, **H. Rhee**, P. Wang, S. Horstemeyer, R. Malley, T. Ritter, D. Baker, R. Radzilowski, “Microalloying to develop third generation advanced high strength steels,” AIST Birmingham Region Chapter Meeting, New Orleans, LA, Nov. 20, 2014.
  44. P. Parajuli, S.S. Patnaik, B.L. Brazile, R. Prabhu, **H. Rhee**, L.N. Williams, J. Liao, “Characterization of the viscoelastic property of mitral valve leaflets,” Biomedical Engineering Society Annual Conference, San Antonio, TX, Oct. 23, 2014.
  45. **H. Rhee**, W. Whittington, M. Horstemeyer, S.-M. Lee, K.-A. Lee, J.-S. Lee, J.-H. Song, “Internal state variable/damage model development of the eco-friendly processed lightweight alloys,” UKC 2014, San Francisco, CA, Aug. 8, 2014 (*invited*).
  46. **H. Rhee**, W. Whittington, R. King, H.-J. Kim, C.-W. Lee, “Process-structure-property relations and multiscale modeling of novel metal matrix metallic composites,” 13<sup>th</sup> International Symposium on Novel and Nano Materials, Krakow, Poland, Jul. 1, 2014 (*invited*).
  47. H. Martin, C. Horstemeyer, W. Song, W. Whittington, S. Turnage, R. Florea, J. Grantham, A. Hicks, **H. Rhee**, R. King, “Welded aluminum 6061: The effect of corrosion on yield strength,” TMS 2014 Annual Meeting & Exhibition, San Diego, CA, Feb. 19, 2014.
  48. N. Lee, M. Horstemeyer, **H. Rhee**, J. Liao, L. Williams, “Multiscale structural and mechanics study of the red-bellied woodpecker beak,” TMS 2014 Annual Meeting & Exhibition, San Diego, CA, Feb. 17, 2014.
  49. **H. Rhee**, W. Whittington, M. Horstemeyer, S.-M. Lee, K.-A. Lee, J.-S. Lee, J.-H. Song, “Multiscale modeling of eco-friendly processed lightweight alloys,” 38<sup>th</sup> International Conference and Expo on Advanced Ceramics and Composites, Daytona Beach, FL, Jan. 31, 2014.
  50. J.-H. Bang, C. Lee, J. Kim, **H. Rhee**, “Hybrid SMT process on automobile electric modules for high reliability,” UKC 2013, Meadowlands, NJ, Aug. 8, 2013 (*invited*).
  51. R.L. King **H. Rhee**, “The joint center for root technology and its impact on eco-friendly automotive manufacturing,” 2013 Spring Conference of the Korean Institute of Metals and Materials (KIMM), Jeju, Korea, Apr. 25, 2013 (*invited*).
  52. I. Aslam, B. Li, **H. Rhee**, P. Wang, F. Goodwin, R. Martens, J. Goodwin, B. Jordan, S. Horstemeyer, “Site-specific studies of interfacial structure of zinc coating of advanced high strength steels,” MS&T 2012 Conference & Exhibition, Pittsburgh, PA, Oct. 9, 2012.
  53. O. Abuomar, R. King, **H. Rhee**, “Artificial intelligence techniques optimization for the classification of 1<sup>st</sup> and 2<sup>nd</sup> generation AHSS,” TMS 2012 Annual Meeting & Exhibition, Orlando, FL, Mar. 14, 2012.
  54. S. Kim, S.-G. Kim, **H. Rhee**, M. Horstemeyer, “The effects of micro-alloying elements on a BCC iron grain boundaries,” 2012 APS March Meeting, Boston, MA, Feb. 29, 2012.
  55. R. King, O. Abuomar, **H. Rhee**, A. Konstantinidis, N. Pavlidou, M. Petrou, “On materials informatics and pattern formation in materials,” ENOC 2011, Rome, Italy, Jul. 24, 2011.
  56. **H. Rhee**, M.F. Horstemeyer, Wes Trim, “A comparison study on the structures and mechanical behaviors of sandwich composite biological structural materials,” MS&T 2010 Conference & Exhibition, Houston, TX, Oct. 18, 2010.
  57. **H. Rhee**, S.-G. Kim, S. Kim, M.F. Horstemeyer, “A study on the materials design of steel alloys: a pathway to develop 3<sup>rd</sup> generation advanced high strength steels,” AIST Birmingham Member Chapter Fall 2009 Meeting, Birmingham, AL, Sep. 15, 2009.
  58. **H. Rhee**, Y. Hwang, S.J. Park, M.F. Horstemeyer, “Investigation on the compressive behavior of turtle’s



- shell: experiment, modeling, and simulation,” TMS 2009 Annual Meeting & Exhibition, San Francisco, CA, Feb. 17, 2009.
59. L. Wang, **H. Rhee**, S.D. Felicelli, A.S. Sabau, J.T. Berry, “Oxide film and porosity defects in magnesium alloy AZ91,” TMS 2009 Annual Meeting & Exhibition, San Francisco, CA, Feb. 17, 2009.
  60. L. Wang, **H. Rhee**, S.D. Felicelli, A.S. Sabau, J.T. Berry, “Interdependence between cooling rate, microstructure and porosity in Mg alloy AE42,” TMS 2009 Annual Meeting & Exhibition, San Francisco, CA, Feb. 17, 2009.
  61. J. Baird, H. El Kadiri, **H. Rhee**, A. Lowry, M. Horstemeyer, P. Wang, “Dynamic recrystallization texture in nickel superalloys 718 and 718 plus,” TMS 2009 Annual Meeting & Exhibition, San Francisco, CA, Feb. 19, 2009.
  62. **H. Rhee**, M.F. Horstemeyer, Y. Hwang, H. Lim, H. El Kadiri, M. Tucker, W. Trim, “A study on the structure and mechanical behavior of the *Terrapene carolina* carapace,” 2008 Bio Inspired Design Conference, Mississippi State, MS, Aug. 21, 2008.
  63. **H. Rhee**, M.T. Tucker, M.F. Horstemeyer, Y. Hwang, “Structures and mechanical behavior of lightweight composite foam materials,” MS&T 2007 Conference & Exhibition, Detroit, MI, Sep. 20, 2007.
  64. G.P. Potirniche, J. Middleton, R. Gomez, B. Bain, H. El Kadiri, **H. Rhee**, N. Williams, P. Wang, M.F. Horstemeyer, “A study of monotonic and cyclic properties of LENS fabricated 4140 and AISI 4140 steel alloys,” TMS 2007 Annual Meeting & Exhibition, Orlando, FL, Feb. 28, 2007.
  65. **H. Rhee**, Y. Hwang, L. Liyanage, M.F. Horstemeyer, “Multiscale structures and mechanical behavior of a biological composite material,” 2006 MRS Fall Meeting, Boston, MA, Nov. 28, 2006.
  66. **H. Rhee**, K.N. Subramanian, “Supporting studies to understand TMF behavior of eutectic Sn-3.5Ag solder joints,” TMS 2005 Annual Meeting, San Francisco, CA, Feb. 2005 (*Invited*).
  67. **H. Rhee**, A. Lee, K.N. Subramanian, “Evaluation of the repeated reverse shear and stress relaxation behavior of eutectic Sn-3.5Ag solder joints,” TMS 2004 Fall Meeting, New Orleans, LA, Sep. 2004.
  68. J.G. Lee, **H. Rhee**, K.N. Subramanian, “Internal stresses on the thermomechanical behavior of Sn-based solder joints,” TMS 2004 Annual Meeting, Charlotte, NC, Mar. 2004 (*Invited*).
  69. **H. Rhee**, K.N. Subramanian, “Roles of service and material parameters on TMF of Sn-based solder joints,” TMS 2004 Annual Meeting, Charlotte, NC, Mar. 2004 (*Invited*).
  70. J.P. Lucas, **H. Rhee**, J.G. Lee, K.N. Subramanian, T.R. Bieler, “Influence of interfacial intermetallic compounds on mechanical properties of thin Pb-based solder joints,” TMS 2004 Annual Meeting, Charlotte, NC, Mar. 2004 (*Invited*).
  71. A.U. Telang, **H. Rhee**, J.P. Lucas, J.P. Bieler, K.N. Subramanian, “Investigation of microstructure evolution on local mechanical properties in Pb-free solder joints using NIT and OIM,” TMS 2003 Fall Meeting, Chicago, IL, Nov. 2003.
  72. **H. Rhee**, K.N. Subramanian, “Effects of pre-strain, rate of pre-strain, and temperature on the stress-relaxation behavior of eutectic Sn-3.5Ag solder joints,” TMS 2003 Fall Meeting, Chicago, IL, Nov. 2003.
  73. **H. Rhee**, F. Guo, J.P. Lucas, K.N. Subramanian, “Mechanical properties of intermetallic compounds formed in Pb-free solder joints during isothermal aging,” TMS 2003 Annual Meeting, San Diego, CA, Mar. 2003.
  74. J.G. Lee, **H. Rhee**, K.N. Subramanian, “Factors contributing to damage accumulation and failure of Sn-based electronic solder joints under thermomechanical fatigue,” TMS 2003 Annual Meeting, San Diego, CA, Mar. 2003 (*Invited*).
  75. **H. Rhee**, F. Guo, K.C. Chen, K.N. Subramanian, “Effects of intermetallic morphology at metallic particle/solder interface on mechanical properties of Sn-Ag based solder joints,” TMS 2003 Annual Meeting, San Diego, CA, Mar. 2003 (*Invited*).
  76. **H. Rhee**, K.C. Chen, J.G. Lee, K.N. Subramanian, “Intermetallic formation and growth around metallic particles in Sn-based solders,” TMS 2003 Annual Meeting, San Diego, CA, Mar. 2003 (*Invited*).
  77. **H. Rhee**, A.U. Telang, J.P. Lucas, T.R. Bieler, K.N. Subramanian, “Effect of microstructure evolution on local mechanical properties in Pb-free solder joints,” TMS 2002 Fall Meeting, Columbus, OH, Oct. 2002.
  78. **H. Rhee**, K.N. Subramanian, A. Lee, T.R. Bieler, “Dynamic thermal/mechanical characterization of lead-free solder joints,” TMS 2002 Fall Meeting, Columbus, OH, Oct. 2002.
  79. **H. Rhee**, M. Moeller, J.P. Lucas, K.N. Subramanian, T.R. Bieler, “Micromechanical characterization of thermomechanically fatigued lead-free solder joints,” TMS 2001 Fall Meeting, Indianapolis, IN, Nov. 2001.
  80. Y.J. Cha, J.S. Chang, B.Y. Choi, **H. Rhee**, H.J. Choi, H.K. Park, S.W. Kim, “Development of preparation

technique of wear resistant steel for heavy industry,” 1998 KIMM Fall Conference, Seoul, Korea, Oct. 1998.

81. C.B. Song, **H. Rhee**, I.K. Suh, “A study on the refinement behavior of carbides due to adding rare earth metals in 5Cr-1Mo steel,” 1995 KIMM Fall Conference, Seoul, Korea, Oct. 1995.
82. J.H. Shin, **H. Rhee**, J.R. Kim, C.H. Han, J.S. Lee, “Microstructure control of high carbon-chromium bearing steel by hot working simulator,” 1995 KIMM Fall Conference, Seoul, Korea, Oct. 1995.
83. B.L. Jang, **H. Rhee**, J.H. Kim, B.C. Kim, Y.H. Lee, “Effects of strain rate and temperature on the hot strength of nitriding steel,” 1995 KIMM Spring Conference, Pusan, Korea, Apr. 1995.
84. **H. Rhee**, S.S. Kim, “A study on the preparation and characterization of high temperature sprayed tungsten carbide coatings,” 1992 KIMM Fall Conference, Seoul, Korea, Oct. 1992.

## RESEARCH PROJECTS

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1. “Methods for Defect Detection in AM Processes,” American Lightweight Materials Manufacturing Innovation Institute (ALMMII), **co-PI**, 12/06/2022-02/28/2024, \$506,413 (Child Account **PI**, \$248,989).
2. “RAD – Advanced Additive Manufacturing and High Throughput Materials Discovery,” US Department of Army Research Lab (ARL), **co-PI**, 08/17/2020-12/31/2023, \$1,500,000 (Child Account **PI**, \$413,780).
3. “Advanced and Additive Manufacturing,” US Army Engineering Research & Development Center (ERDC), **co-PI**, 12/20/2022-12/19/2025, \$3,065,924 (Child Account **PI**, \$487,016).
4. “Improvement of Charpy Performance of HSLA Steels,” Steel Dynamics, Inc. (SDI), **co-PI**, 04/04/2022-04/03/2024, \$160,000 (+\$100,000 CAVS Cost Share).
5. “Steel Performance Initiative: Steel Technology Advance Research (STAR),” Steel Founders Society of America (SFSA), **PI**, 04/14/2022-02/28/2024, \$170,198.
6. “Methods for Defect Detection in AM Processes,” ALMMII, **co-PI**, 10/15/2021-02/15/2023, \$499,995 (Child Account **PI**, \$245,373).
7. “Parametric Study of Additive Manufacturing using Martian Regolith Metal Recovered with Ionic Liquids,” National Aeronautics and Space Administration (NASA), **PI**, 10/01/2021-10/31/2023, \$47,500 (+\$60,000 CAVS Cost Share).
8. “Ultra High Strain Rate Response (Military Engineering Task 8),” US Army ERDC, **co-PI**, 05/26/2021-12/31/2023, \$399,524.
9. “NextGen Metals for Cost Effective Force Protection (Military Engineering Task 9),” US Army ERDC, **co-PI**, 05/26/2021-12/31/2023, \$743,977.
10. “RAD – Advanced Additive Manufacturing and High Throughput Materials Discovery,” ARL, **co-PI**, 08/17/2020-08/16/2022, \$2,100,000 (Child Account **PI**, \$273,477).
11. “Towards Steelmaking from Martian Regolith Metals Recovered using Ionic Liquids – Phase II,” NASA, **PI**, 09/01/2020-12/31/2021, \$46,554 (+\$83,670 CAVS Cost Share).
12. “Investigation of Auto Parts Procurement/Evaluation for OEMs in the Southeastern United States,” Korea Institute of Industrial Technology (KITECH), **PI**, 01/01/2020-12/31/2020, \$15,287.
13. “A Novel Intermediate Strain Rate Mechanical Testing Technology and System,” National Science Foundation (NSF), **co-PI**, 01/08/2020, \$250,000/2yr.
14. “A Coupled Thermo-Mechanical Approach to Quantify the Chemistry-Process-Structure-Property-Performance Relationships of Additive Manufacturing Processes – Characterization of Recrystallization Behavior and Surface Effects during Cold Spray,” National Center for Manufacturing Sciences (NCMS), **PI**, 03/01/2020, \$460,201/18mo (+\$15,963 CAVS Cost Share).
15. “A Coupled Thermo-Mechanical Approach to Quantify the CPSPP Relationships of Additive Manufacturing Processes – Mean-Field and Full-Field Crystal Plasticity Modeling of Cold Spray Components,” NCMS, **co-PI**, 03/01/2020, \$465,102/18mo.
16. “A Coupled Thermo-Mechanical Approach to Quantify the CPSPP Relationships of Additive Manufacturing Processes – Dynamic Response Quantification of Cold Spray Components,” NCMS, **co-PI**, 03/01/2020, \$475,230/18mo.
17. “Tool Kinetics Simulator,” Milwaukee Tool, **co-PI**, 02/12/2020, \$90,000/1yr.
18. “Transitioning Material Systems from Laboratory to Fabrication,” US Army Research Office (ARO), **co-PI**,

- 08/17/2015-07/31/2021, \$17,999,930 (Child Account **PI**, \$2,265,208).
19. "Towards Steelmaking from Martian Regolith Metals Recovered using Ionic Liquids," NASA, **PI**, 05/01/2019, \$47,790/1yr (+\$81,790 CAVS Cost Share).
  20. "High Mobility Multipurpose Wheeled Vehicle (HMMWV) Light-weighting Project," AM General, LLC., **co-PI**, 03/12/2019-05/06/2022, \$6,998,540 (Child Account **PI**, \$2,021,855).
  21. "Steel Research Working Group," Mississippi State University, **PI**, 08/01/2019, \$2,500/1yr.
  22. "Preliminary study on optimization of the additive manufacturing process through machine learning," KITECH, **PI**, 03/15/2019, \$12,671K/1yr.
  23. "Steel Research Working Group," Mississippi State University, **PI**, 08/1/2018, \$2,500/1yr.
  24. "Analysis of Foreign Material on the Die-Pressed Component," Toyota Motor Manufacturing, Mississippi, Inc., **PI**, 06/20/2017, \$15,000/1mo.
  25. "Steel Research Working Group," BCoE (Mississippi State University), **PI**, 08/1/2017, \$2,500/1yr.
  26. "Bench Scale Demonstration of Bosch Process for Carbon Dioxide Reduction for the Steel Industry," NASA, **PI**, 07/28/2016, \$398,550/3yr.
  27. "Insulator Evaluation Test Program for Peak Demand, Inc.," Peak Demand Incorporated, **PI**, 10/17/2016, \$112,554K/4yr.
  28. "Additive Manufacturing of Fatigue Resistant Materials," NSF, **co-PI**, 02/08/2016, \$289,000/3yr.
  29. "Microstructure and Phase Analyses," Steel Dynamics Inc., **PI**, 06/30/2015, \$37,495/6mo.
  30. "Fundamental Investigation of Zinc-Coating of Advanced High Strength Steels Directed by Multiscale Modeling and Experiments," NSF, **participant**, \$289,037/3yr.
  31. "HPC Modeling and Definition of Blast Environment and Loads on Surfaces," DOD, **participant**, \$1.3M/1yr.
  32. "International Research Working Group Grant: Novel Metal Matrix Metallic Composites Design," International Institute (Mississippi State University), **PI**, 12/15/2014, \$5,000/1yr.
  33. "ORED Cross College Research Program: Targeted Drug Delivery via Magnetic Nanoparticles for Canine Osteosarcoma," ORED (Mississippi State University), **co-PI**, 10/15/2014, \$2,000/1yr.
  34. "BCOE Research Working Group Program: Biomechanics and Bio-Inspired Design Group," BCoE (Mississippi State University), **co-PI**, 09/08/2014, \$2,000/1yr.
  35. "Extend MSU ISV Metal Plasticity Damage Model," DOD, **Participant**, 08/15/2014, \$169,270/1yr.
  36. "Integrated Virtual Prototyping of Multiscale Cementitious Materials Model," DOD, **co-PI**, 08/15/2014, \$419,848/1yr.
  37. "Integrated Virtual Prototyping of Physically-Based Multiscale Polymer Materials," DOD, **co-PI**, 08/15/2014, \$356,678/1yr.
  38. "Integrated Virtual Prototyping of High Strength Steels," DOD, **co-PI**, 08/15/2014, \$513,718/1yr.
  39. "Failure and Fragmentation Modeling," DOD, **Participant**, 08/15/2014, \$193,700/1yr.
  40. "Integrated Virtual Prototyping of Bio-Inspired Materials," DOD, **PI**, 08/15/2014, \$389,653/1yr.
  41. "ORED Cross College Research Program: Bio-Inspired Design & Image Processing Group," ORED (Mississippi State University), **co-PI**, 10/11/2013, \$2,000/1yr.
  42. "ORED Cross College Research Program: Cross-Disciplinary Undergraduate Research and Education Group," ORED (Mississippi State University), **co-PI**, 10/11/2013, \$2,000/1yr.
  43. "Research to Extend MSU Multi-Scale and Multi-Physics Models to Investigate Their Use for Impact and Penetration Analyses," DOD, **co-PI**, 09/16/2013, \$161,284/1yr.
  44. "Fragmentation Modeling," DOD, **Participant**, 09/16/2013, \$233,044/1yr.
  45. "Bio-Inspired Design," DOD, **PI**, 09/16/2013, \$389,361/1yr.
  46. "Validated Multiscale Metal Materials Model," DOD, **co-PI**, 09/16/2013, \$505,737/1yr.
  47. "Physically-Based Multiscale Polymer Modeling," DOD, **co-PI**, 09/16/2013, \$309,940/1yr.
  48. "Multiscale Cementitious Materials Model," DOD, **co-PI**, 09/16/2013, \$414,784/1yr.
  49. "BCOE Research Working Group Program: Biomechanics and Bio-Inspired Design Group," BCoE (Mississippi State University), **co-PI**, 09/04/2013, \$2,000/1yr.
  50. "High Strain Rate Material Testing, Modeling, and Internal State Variable (Damage) Model Development," US Army TARDEC, **PI**, 05/01/2013, \$200,359/1yr.

51. "Establishment of Severstal – MSU Steel Research Center: Phase I – Purchasing Vacuum Induction Melting Furnace," Severstal NA, **PI**, 09/27/2012, \$202,800/1yr.
52. "Simulation of Weld Joints subject to Fatigue, Corrosion, and Blast," US Army TARDEC, **PI**, 09/26/2012, \$449,941/18mo.
53. "BCOE Research Working Group Program: Biomechanics and Bio-Inspired Design Group," BCOE (Mississippi State University), **co-PI**, 08/17/2012, \$2,000/1yr.
54. "Study on Dynamic Behavior of Aluminum Alloys for Lightweight Auto Body," KITECH, **PI**, 01/15/2012, \$29,375/1yr.
55. "2011-2012 Cross-College Research Grant Program: Cross-Disciplinary Undergraduate Research and Education," ORED (Mississippi State University), **co-PI**, \$2,000/1yr.
56. "2011-2012 Cross-College Research Grant Program: Image Processing in Bio-inspired Materials Design," ORED (Mississippi State University), **co-PI**, \$2,000/1yr.
57. "Structural-Mechanical Property Measurement for Biological Materials," US Army ERDC, **co-PI**, 09/01/2011, \$108,994/2yr.
58. "Development of Resistance Spot Welding Technology for Automotive Mg Alloys," KITECH, **PI**, 06/01/2011, \$30,211/1yr.
59. "Inhibition Layer Formation and Galvanneal Growth on Advanced High Strength Steels," International Zinc Association, **PI**, 03/31/2011, \$125,000/3yr.
60. "Calibration and Validation of the MSU Plasticity-Damage Model 1.0 under Quasi-static and Dynamic Monotonic Loading Conditions for Different Metal Alloys," US Army ERDC, **co-PI**, 03/11/2011, \$205,881/1yr.
61. "Heating and Quenching Process Simulation for Hot Press Forming of 22MnB5 Steel," KITECH, **PI**, 12/15/2010, \$34,013/1yr.
62. "High Strain Rate Material Testing, Modeling, and Internal State Variable (Damage) Model Development," US Army TARDEC, **PI**, 09/03/2010, \$400,000/18mo.
63. "Multiscale Materials Modeling and Characterization of Steels Alloys," DOE, **PI**, 08/25/2010, \$605,795/2yr.
64. "Multiscale Material Models and Processing Design of Polymeric Materials," DOE, **co-PI**, 08/25/2010, \$661,358/2yr.
65. "Service Center," DOE, **PI**, 08/25/2010, \$177,517/2yr.
66. "Materials Design of Lightweight Alloys," DOE, **co-PI**, 10/01/2009, \$348,726/2yr.
67. "Bio-Inspired Design," DOE, **co-PI**, 10/01/2009, \$205,324/2yr.
68. "Multiscale Human Body Simulation," US Army TARDEC, **co-PI**, 09/29/2010, \$346,194/18mo.
69. "Bio Inspired Armor Systems (BIAS)," CAVS, **PI**, 05/01/2006, \$89,000/1yr.

## ACADEMIC / RESEARCH ADVISEMENT

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- Advised, co-advised, or served as a committee member for more than 100 undergraduate students, 25 Master's students, and 25 Doctoral students.

### Ph.D.

1. Fatima Hilali, Mechanical Engineering, Primary Advisor, Spring 2025 (expected).
2. Aulora Rusk, Mechanical Engineering, Primary Advisor, Spring 2025 (expected).
3. Wissal Fdili, Mechanical Engineering, Primary Advisor, Fall 2024 (expected).
4. Blake Stewart, Mechanical Engineering, Primary Advisor, Summer 2022 (graduated).
5. William Williams, Mechanical Engineering, Primary Advisor, Fall 2021 (graduated).
6. Mukti Patel, Mechanical Engineering, Primary Advisor, Spring 2021 (graduated).
7. Matt Cagle, Mechanical Engineering, Primary Advisor, Summer 2020 (graduated).
8. Imran Aslam, Mechanical Engineering, Co-Advisor, Fall 2018 (graduated).
9. Denver Seely, Mechanical Engineering, Co-Advisor, Spring 2018 (graduated).

### **M.S.**

10. Mary Mederos, Mechanical Engineering, Co-Advisor, Fall 2023 (expected).
  11. Issam Hammane (Non-Thesis), Mechanical Engineering, Primary Advisor, Fall 2023 (expected).
  12. Taymae Ben Messaoud (Non-Thesis), Mechanical Engineering, Primary Advisor, Fall 2022 (graduated).
  13. Dawn Van Iderstine, Mechanical Engineering, Co-Advisor, Summer 2022 (graduated).
  14. David Salley, Mechanical Engineering, Primary Advisor, Spring 2022 (graduated).
  15. Kimberly Dickey, Mechanical Engineering, Primary Advisor, Spring 2021 (graduated).
  16. Hala Ben Messaoud (Non-Thesis), Mechanical Engineering, Primary Advisor, Spring 2021 (graduated)
  17. Ali Lenfar (Non-Thesis), Mechanical Engineering, Primary Advisor, Spring 2020 (graduated).
  18. Zineb Baaout (Non-Thesis), Mechanical Engineering, Primary Advisor, Fall 2019 (graduated).
  19. Cody Dyar, Mechanical Engineering, Primary Advisor, Fall 2017 (graduated).
  20. Jacob Coleman, Mechanical Engineering, Primary Advisor, Fall 2013 (graduated).
  21. Matthew Jones, Mechanical Engineering, Co-Advisor, Fall 2012 (graduated).
- Supervised 15 Research Faculty, 17 Research Engineers, 21 Post-doctoral Associates, 6 Research Associates, 2 Lab Managers, 2 Lab Coordinators, and 1 Office Staff as the Associate Director for the Engineering Mechanics and Materials Science (EMMS) thrust at CAVS.
  - 12 of former mentees were hired as tenure track academic faculty.

## **SERVICE**

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- **University Service**

- **Departmental Committee and Service**

- Research Coordinator: 2023 – present.
- Service Coordinator: 2022 – 2003.
- Service Director: 2021 – 2022.
- Chair of the Student Competition Oversight Committee: 2021 - 2022.
- Chair of the Course Standardization ABET Materials Engineering Committee: 2020 – present.
- Chair of the Solid Mechanics and Materials Faculty Search Committee: 2020 – 2021.
- Member of the Undergraduate Committee: 2020 – present.
- Member of the Student Competition Oversight Committee: 2020 – 2021.
- Chair of the CAVS Chair Professor Search Committee: 2020 – 2020.
- Member of the Department Strategic Committee: 2020 – present.
- Chair of the Materials Science and Engineering Qualifying Exam Committee: 2020 – present.
- Member of the CAVS Chair Professor Search Committee: 2019 – 2019.
- Member of the Department Course Standardization ABET Committee: 2018 – present.
- Member of the Course Standardization ABET Materials Engineering Committee: 2018 – 2020.
- Member of the Solid Mechanics and Materials Faculty Search Committee: 2018 – 2020.
- Member of the Materials Science and Engineering Qualifying Exam Committee: 2018 – 2019.

- **University Committee and Service**

- Chair of the Materials Certificate Program Committee: 2021 – present.
- Chair of the BCoE Steel Working Group: 2017 – present.
- Member of the BCoE Materials Working Group: 2015 – present.
- Associate Director in the Engineering Mechanics and Materials Science (EMMS) thrust at the Center for Advanced Vehicular Systems (CAVS): 2010 – present.

- Other Services
  - Supported industry: Toyota, Nissan, Yokohama Tires, Steel Dynamics, Inc., Milwaukee Tool, PACCAR, HolMac, Pontotoc Springs, Hunter Fan, Southwire (all in MS), Big River Steel (AR), Apple (CA), REL (MI), Allium Eng. (MA), Medtronic (TN), etc.
  - Supported academic departments and centers: ME, ABE, ASE, CEE, ChE, ECE, ISE, Forest Products, Advanced Composite Institute (ACI), Raspet Flight Research Lab, Institute for Imaging and Analytical Technologies (I<sup>2</sup>AT), etc.
  - Supported international collaborative relationship development between MSU and multiple universities, research institutes, and government labs in South Korea, Japan, U.K., etc.
  - Participated in the Office of Research and Economic Development (ORED) – Mississippi School of Mathematics and Science (MSMS) Research Program as a mentor.
  - Provided numbers of tours and technology demonstrations for international, domestic, and internal visitors including faculty candidates to CAVS, ME (Carpenter & Patterson Bldg.), Steel Manufacturing Lab (Edwards Bldg.), etc.
- **Public Service**
  - **Public Service**
    - Shareholder and board member of MSU start-up profit organization, *Standard Dynamics, LLC* in Starkville, MS.
    - Supported needs from various domestic industries and other universities.
    - Manufactured several PPE disinfectant devices and donated them to local health care centers.
  - **Professional Association Service**
    - Journal Editorial Board for the *Advances in Automobile Engineering*.
    - Technical Committee and Advanced Materials Processing (AMP) Session Organizer for the *International Symposium on Novel and Nano Materials (ISNNM)*.
    - Frequent reviewers for peer-reviewed journals
    - Member of *The Mineral, Metals, and Materials Society (TMS)*, *Association for Iron & Steel Technology (AIST)*, *The American Society of Mechanical Engineers (ASME)*, *The American Ceramic Society (ACerS)*, *American Society for Engineering Education (ASEE)*, *Korean-American Scientists and Engineers Association (KSEA)*, etc.

## AWARDS

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- **2022 Mechanical Engineering Faculty Support for Excellence**, Mechanical Engineering (ME), Mississippi State University
- **2021 Senior Faculty Outstanding Research Award**, ME, Mississippi State University
- **2021 Mechanical Engineering Faculty Support for Excellence**, ME, Mississippi State University
- **2020 Mechanical Engineering Faculty Support for Excellence**, ME, Mississippi State University
- **2019 Mechanical Engineering Faculty Support for Excellence**, ME, Mississippi State University
- **2011 StatePride Faculty Award**, Mississippi State University
- **Outstanding Paper**, 2007 Emerald Literati Network Awards for Excellence  
**H. Rhee**, K.N. Subramanian, Soldering and Surface Mount Technology 18 (2006) 19-28.
- **Outstanding Paper**, Emerald Literati Club, 2004 Award for Excellence  
**H. Rhee**, K.N. Subramanian, A. Lee, J. Lee, Soldering and Surface Mount Technology 15 (2003) 21-26.

## **PATENTS**

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- H.-J. Kim, J.-H. Lee, K.-C. Hwang, C.-W. Lee, **H. Rhee**, and R. King, "Al matrix composite with annular shape and its method," Korea Patent, Nov. 2013.
- S.W. Boo, **H. Rhee**, and Y.O. Lee, "Cr-Mo alloy steel and the manufacturing method of bolt-nut with low temperature use," Korea Patent No. 10-0262440-0000, May 2000.
- J.W. So and **H. Rhee**, "Method for manufacturing high-strength Ni-Cr-V steel material for conveyor chain," Korea Patent No. 10-0147719-0000, May 1998.
- J.W. So and **H. Rhee**, "Method for manufacturing Mn-steel for conveyor chain," Korea Patent No. 10-0147720-0000, May 1998.

## **REFERENCES**

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- References Available Upon Request