Hyeji Im, Ph.D.

Case Western Reserve University, Materials Science and Engineering
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SPECIALTIES Physical metallurgy; additive manufacturing of structural alloys; high-temperature alloy development and materials; characterization; microstructureproperty relationships; phase transformations in metallic materials

EDUCATION

Korea Advanced Institute of Science and Technology (KAIST) Daejeon, South Korea
Ph.D. in Materials Science and Engineering Sep 2016 – Aug 2020
Development and characterization of W-free Co-based superalloys
• Supervisor: Prof. Pyuck-Pa Choi

KAIST Daejeon, South Korea
M.S. in Materials Science and Engineering Sep 2014 – Aug 2016
Fabrication and characterization of Graphene/Metal/Polymer composites for EMI shielding
• Supervisor: Prof. Soon Hyung Hong

Inha University Incheon, South Korea
B.S. in Materials Science and Engineering Mar 2010 – Aug 2014

EMPLOYMENT

Case Western Reserve University Cleveland, United States
Assistant professor | Materials Science and Engineering Feb 2024 – Current
Design and manufacture of structural materials for technology and sustainability

Northwestern University Evanston, United States
Postdoctoral scholar | McCue Research Group Feb 2022 – Jan 2024
Selective laser melting of plasma-facing materials
Postdoctoral scholar | Dunand Research Group Oct 2021 – Oct 2023
Selective laser melting of Co-based superalloys

KAIST Daejeon, South Korea
Postdoctoral scholar | Nano Materials & Adv. Characterization Lab. Sep 2020 – Sep 2021
Directed energy deposition of stainless steel and laser peening of Mo-based alloys

RESEARCH EXPERIENCE

Max-Planck-Institut für Eisenforschung Düsseldorf, Germany

Guest researcher | Atom Probe Tomography (APT) Group Jan 2019 – Aug 2019

Understanding of mechanical behavior using high-resolution characterization techniques

Guest researcher | APT Group Jul 2017 – Feb 2018

Application of atom probe crystallography techniques to Co-based superalloys

Korea Institute of Industrial Technology Incheon, South Korea

Intern Jan 2013

Analysis of mechanical behaviour using Vickers hardness test

RESEARCH GRANTS

• PI, "Quantitative characterization of chemical interaction of solutes with defects for predicting intergranular corrosion", $49,000, Jan 2025 – Sep 2026, *Center for Materials Data Science for Reliability and Degradation (MDS-RELY, NSF).*

• Co-PI, "Residual Stress", Jan 2025 – Dec 2026, *Center for Hybrid Autonomous Manufacturing Moving from Evolution to Revolution (HAMMER, NSF).*

PUBLICATIONS **Peer-reviewed Journals** (*corresponding author)

• K. Ryou, **H. J. Im**, S.-H Lim, K. Jang, S. Lim, J. Park, W. S. Choi*, P.-P Choi*. Additive manufacturing for bulk production of immiscible alloys with droplet microstructures. *Materials Science and Engineering A*, 944:148903, 2025.

• **H. J. Im***, D. Dunand. Microstructure, hardness, and creep of Co-Fe-Ni-based high-entropy superalloy processed by laser powder-bed fusion. *Materials Science and Engineering A*, 916:147378, 2024.

• K. Ryou, Y. Park, **H. J. Im***, P.-P Choi*. Prevention of hot cracking in Ni-based superalloy via passivation layer formation during additive manufacturing. *Journal of Materials Research and Technology*, 33:3155–3162, 2024.

• **H. J. Im***, J. Santos, C. Campbell, D. Dunand. Co-Ni-Al-W γ/γ' superalloy with Cr and Ti additions fabricated via laser fusion of elemental powders. *Materials Science and Engineering A*, 914:147105, 2024.

• **H. J. Im***, J. Santos, C. Liu, C. Campbell, D. Dunand. Microstructure and properties of Co-Ni-Al-W γ/γ' superalloy fabricated via laser fusion of elemental powders. *Additive Manufacturing*, 76:103790, 2023.

• K. Ryou, **H. J. Im**, J. Park*, P.-P Choi*. Microstructural evolution and hot cracking prevention in direct-laser-deposited Ni-based superalloy through Hf addition. *Materials & Design*, 234:112298, 2023.

• **H. J. Im**, K. Ryou, T. H. Kang, S. Jimbo, S. Nambu, J. Han, P.-P Choi*. Thermally driven

changes in the microstructure and mechanical properties of martensitic 15-5 precipitation-hardened stainless steel during directed energy deposition. *Additive Manufacturing*, 74:103729, 2023.

• M. S. Jeong, T. M. Park, D.-I Kim, H. Fujii, **H. J. Im**, P.-P Choi*, S.-J Lee*, J. Han*. Improving toughness of medium-Mn steels after friction stir welding through grain morphology tuning. *Journal of Materials Science & Technology*, 118:243–254, 2022.

• **H. J. Im**, S. K. Makineni, C.-S Oh, B. Gault, P.-P Choi*. Elemental sub-lattice occupation and microstructural evolution in γ/γ' Co-12Ti-4Mo-Cr alloys. *Microscopy and Microanalysis*, 28(4):1335–1339, 2022.

• **H. J. Im**, W. S. Choi, K. Ryou, T. H. Kang, J. B. Seol, W.-S Ko*, P.-P Choi*. Enhanced microstructural stability of γ/γ'-strengthened Co-Ti-Mo-based alloys through Al additions. *Acta Materialia*, 214:117011, 2021.

• **H. J. Im**, S. Lee, W. S. Choi, S. K. Makineni, D. Raabe, W.-S Ko*, P.-P Choi*. Effects of Mo on the mechanical behavior of γ/γ'-strengthened Co-Ti-based alloys. *Acta Materialia*, 197:69–80, 2020.

• J. Han, B. Yoo, **H. J. Im**, C.-S Oh, P.-P Choi*. Microstructural evolution of the heat affected zone of a Co-Ti-W alloy upon laser cladding with a CoNiCrAlY coating. *Materials Characterization*, 158:109998, 2019.

• B. Yoo, **H. J. Im**, J. B. Seol, P.-P Choi*. On the microstructural evolution and partitioning behavior of $L1_2$-structured γ'-based Co-Ti-W alloys upon Cr and Al alloying. *Intermetallics*, 104:97–102, 2019.

• **H. J. Im**, J. Y. Oh, S. Ryu, S. H. Hong*. The design and fabrication of multilayered graded GNP/Ni/PMMA nanocomposite for enhanced EMI shielding behavior. *RSC Advances*, 9(20):11289–11295, 2019.

• **H. J. Im**, S. K. Makineni, B. Gault, F. Stein, D. Raabe, P.-P Choi*. Elemental partitioning and site-occupancy in γ/γ' forming Co-Ti-Mo and Co-Ti-Cr alloys. *Scripta Materialia*, 154:159–162, 2018.

• **H. J. Im**, G. H. Jun, D. J. Lee, H. J. Ryu*, S. H. Hong*. Enhanced electromagnetic interference shielding behavior of Graphene nanoplatelet/Ni/Wax nanocomposites. *Journal of Materials Chemistry C*, 5(26):6471–6479, 2017.

Book Chapters

• P.-P Choi, **H. J. Im**, C. Jung, K. H. Ryou, H. Jeong. "Atom Probe Tomography: Unveiling the elemental distribution in nanostructured materials with near-atomic resolution." in *Encyclopedia of Materials: Metals and Alloys*, ed. F. G. Caballero (Elsevier, 2022) 4:641–647.

PATENTS

• S. H. Hong, H. J. Ryu, J. Y. Oh, **H. J. Im**. 2020. Multi-layer graphene-metal-polymer sheet for shielding electromagnetic wave. Korea Patent 10-2128067-0000, issued June 23, 2020.

• P.-P Choi, **H. J. Im**, B. R. Yoo, W. S. Choi. 2020. γ/γ' microstructure Co-based alloy with excellent high-temperature strength. Korea Patent 10-2197124-0000, issued December 23, 2020.

• S. H. Hong, H. J. Ryu, J. Y. Oh, **H. J. Im**. 2019. Multi-layer graphene-metal-polymer sheet for shielding electromagnetic wave. U.S. Patent 10,306,818, issued May 28, 2019.

CONFERENCES

• "Accelerated Development of Tungsten Alloy Plasma Facing Materials," TMS Spring Meeting 2025, USA, 2025.

• "Accelerated Development of Tungsten Alloy Plasma Facing Materials," TMS Spring Meeting 2024, USA, 2024.

• "Effect of scanning strategies and additive elements on the microstructure and mechanical properties of tungsten manufactured by laser powder-bead fusion," 2023 MRS Fall Meeting, USA, 2023.

• "Enhancing the Performance of Plasma-Facing Materials through Additive Manufacturing ," 2023 MRS Fall Meeting, USA, 2023.

• "Enhancing the performance of plasma-facing materials and γ/γ' superalloys by laser powder-bed fusion," Gordon Research Conference: 2023 Physical Metallurgy, USA, 2023 (Poster).

• "Microstructure and mechanical properties of Co-based superalloy with γ/γ' microstructure fabricated by laser powder bed fusion," Materials Science & Technology 2022, USA, 2022.

• "Effects of alloying elements on microstructures of Co-based superalloys by atom probe tomography," The 6th International Conference on Electronic Materials and Nanotechnology for Green Environment, South Korea, 2020.

• "The effects of alloying elements on microstructures of γ/γ'-strengthened Co-Ti-based alloys," 2020 Spring Conference of the Korean Institute of Metals and Materials, South Korea, 2020. ***- awarded Best Student Oral Presentation***

• "The effects of alloying elements on microstructures and mechanical properties of γ/γ'-strengthened Co-Ti-based alloys," 2019 Fall Conference of the Korean Institute of Metals and Materials, South Korea, 2019. ***- awarded Best Student Oral Presentation***

• "Elemental partitioning and site occupation of Mo and Cr in Co-Ti based superalloys," Atom Probe Tomography and Microscopy 2018, USA, 2018.

• "The effects of alloying elements on microstructures and mechanical properties of γ/γ'-strengthened Co-Ti-based alloys," 2018 Fall Conference of the Korean Institute of Metals and Materials, South Korea, 2018. ***- awarded Best Student Oral Presentation***

• "Elemental partitioning and site-occupancy behavior in γ/γ'-strengthened Co-Ti-based superalloys," 2018 Spring Conference of the Korean Institute of Metals and Materials, South Korea, 2018.

• "The effect of alloying elements and process on the microstructure of Co-based superalloys," 2017 Spring Conference of the Korean Institute of Metals and Materials, South Korea, 2017. (Poster)

• "Multi-layer structure design of GNP/Ni/PMMA nanocomposites for enhanced EMI shielding," The 3rd Korean Graphene Symposium, South Korea, 2016.

• "Fabrication and characterization of Graphene/Metal/Polymer nanocomposites for EMI shielding," 2015 Fall Conference of the Korean Institute of Metals and Materials, South Korea, 2015.

INVITED TALK

• ASM Cleveland Chapter Symposiums – High-Temperaure Materials, "High-Temperature Materials (HTM) essentials," Jan 14, 2026.

• CSE Chemical Engineering Department Seminar, "Beyond Temperature Limits: Designing Alloys for Extreme Environments," Oct 30, 2025.

SUPERVISION

Doctoral Dissertations in Progress

• Yixiao He (Sep 2024 –)

• Nadia Akter (Jan 2026 –)

Undergraduate Students

• Anselm Kabwa (2024)

• Erin Huang (2024)

• David Kaplan (2024 – 2025)

• Ian Suddarth (2024 – 2025)

• Suhani Dangre (2024 – 2025)

• Kenta Yap (2025)

• James Kinney (2025)

• Ellen Lee (2025)

COURSES

Fall 2024

• EMSE 320 Materials Laboratory II

• EMSE 398&399 Senior Project in Materials I&II

Spring 2025

• EMSE 417 Properties of Materials in Extreme Environments

• EMSE 398&399 Senior Project in Materials I&II

Fall 2025

• EMSE 499&599 Critical Review of Materials Science and Engineering Colloquium

• EMSE 398&399 Senior Project in Materials I&II

Spring 2026

• EMSE 319 Processing and Manufacturing of Materials (Spring 2026)

• EMSE 398&399 Senior Project in Materials I&II

SERVICE

Professional Leadership and Service

• *The Minerals, Metals and Materials Society (TMS)*

Advanced Characterization, Testing, and Simulation Committee (2025 –)

• *Proposal or Award Reviewer*

National Science Foundation (NSF) – Advanced Manufacturing (Mar 2025)

National Science Foundation (NSF) – Advanced Manufacturing (Dec 2024)

National Aeronautics and Space Administration (NASA) – Biological and Physical Sciences (Aug 2025)

• *Symposium Organizer*

Fundamentals of Sustainable Metallurgy and Processing of Materials – TMS 2026

• *Journal Reviewer*

Acta Materialia, Scripta Materialia, Additive Manufacturing, Journal of Alloys and Compounds, Journal of Materials Research and Technology, Materials Characterization, and Advanced Engineering Materials

University Leadership and Service

• *Thesis Committee Member*

Mirra Rasmussen. M.S. in Materials Science and Engineering (Jul 2024)

Kristen Hernandez. M.S. in Materials Science and Engineering (Apr 2025)

Anthony Lino. M.S. in Materials Science and Engineering (Jul 2025)

Oluwatumininu Adeeko. M.S. in Materials Science and Engineering (Dec 2025)

Stephen Kellogg. M.S. in Materials Science and Engineering (Dec 2025)

Matthew Adams. M.S. in Materials Science and Engineering (Dec 2025)

Maliesha Kalutotage. M.S. in Materials Science and Engineering (Dec 2025)

- *Ph.D. Qualifying Exam Committee Member*

  Kristen Hernandez (Dec 2024)

  Maliesha Kalutotage (May 2025)

  Jonah Bachman (May 2025)
- *Ph.D. Proposal Committee Member*

  Kristen Hernandez (Jan 2026)
- *MSE Undergraduate Studies Committee Member (2024 –)*
- *MetLab Supervisor (2024 –)*
- *MSE Faculty Search Committee Member (2025)*
- *Case School of Engineering Research Committee Member (2024 –)*