

Curriculum Vitae (Taehyeob Im)

Research Fellow in Mechanical and Aerospace Engineering, Nanyang Technological University, Singapore, E-mail: taehyeob.im@gmail.com | Phone: +82-10-9476-7533

Education / Work Experience

Feb. 2026 – Present: Research Fellow, Nanyang Technological University, Singapore

- PI: Professor Seung Ki Moon

Sep. 2025 – Jan. 2026: Post-Doctoral Researcher, Hanyang university, South Korea

- PI: Professor Caroline Sunyong Lee

Mar. 2019 – Aug. 2025: Integrated M.S./Ph.D. Program, Hanyang university, South Korea

- Thesis: *Design of Insulation Layer Structures in 3-Dimensional Soft Magnetic Cores Based on High-Si Fe Alloys for Motor Applications*
- Advisor: Professor Caroline Sunyong Lee

Jan. 2021 – Jun. 2021: Visiting researcher, Additive Manufacturing Research Group, KU Leuven, Belgium

- Conducted material design and process optimization for laser powder bed fusion using pre-alloyed water-atomized low alloy steel powder.
- PI: Professor Brecht Van Hooreweder

Mar. 2013 – Feb. 2019: B.S. in Hanyang university, South Korea

Research Interests

- Additive manufacturing (Material extrusion, Laser powder bed fusion)
- Data-driven process optimization
- Powder and alloy design
- Sintering-based processing (Spark plasma sintering, Furnace sintering)
- Soft magnetic materials

Journal Publications (First author: 9, Co-author: 8)

1. Taehyeob Im, Minjong Kim, Gertrude Mugwe Mongella, Nelson Bayi, Caroline Sunyong Lee*, *Sustainable powder metallurgy route to densify oxide-derived CoCrFeNi high-entropy alloy*, *Materials Today Sustainability*, 34, 101330 (2026).
2. Taehyeob Im, Minjong Kim, Jonghyeok Ahn, Suyeon Kim, Hansol Lee, Kwiyoung Lee, Dongju Lee, Jai-Sung Lee, Jongryoul Kim**, Caroline Sunyong Lee*, *Green Hybrid Manufacturing of 3-Dimensional Fe–6.5%Si Magnetic Cores Integrated with Insulation Layers via Material Extrusion and Spark Plasma Sintering*, *International Journal of Precision Engineering and Manufacturing-Green Technology* (2025).
3. Taehyeob Im, Suyeon Kim, Juyong Kim, Minjong Kim, Jonghyeok Ahn, Kwiyoung Lee, Dongju Lee, Jai-Sung Lee, Jongryoul Kim**, Caroline Sunyong Lee*, *Additive Manufacturing of Fe-6.5Si Cores with Metal-Insulator-Metal Structure via Dual-nozzle Material Extrusion (MEX) Technology*, *Virtual and Physical Prototyping*, 20, 1 (2025).

4. Taehyeob Im, Kwiyoung Lee, Jonghyeok Ahn, Minjong Kim, Dongsup Lee, Jai-Sung Lee, Jongryoul Kim**, Caroline Sunyong Lee*, *Fabrication of Fe-4.5 wt% Si core-shell soft magnetic composite (SMC) via milling assisted pressureless sintering method for high-frequency application*, Journal of Materials Research and Technology, 33, 2624–2637 (2024).
5. Taehyeob Im, Heungseok Oh, Byeonghwa Goh, Juyong Kim, Jai-Sung Lee, Joonmyung Choi**, Caroline Sunyong Lee*, *Introduction to subpressure-driven soft deformation method for removing inherent voids in green components manufactured by material extrusion*, Heliyon, 10, 7, E28689 (2024).
6. Taehyeob Im, Jin-Young Kim, Kopila Gurung, Sebastian Meyers, Brecht Van Hooreweder, Jai-Sung Lee, Jin-Kyung Kim*, Caroline Sunyong Lee*, *Impact of laser scanning strategies on microstructure in laser powder bed fusion (LPBF) of nanoparticle-infused pre-alloyed water-atomized iron powder*, Materials Science and Engineering: A, 891, 145989 (2024).
7. Taehyeob Im, Kopila Gurung, Sebastian Meyers, Antonio Cutolo, Heungseok Oh, Jai-Sung Lee, Brecht Van Hooreweder*, Caroline Sunyong Lee*, *A new strategy for metal additive manufacturing using an economical water-atomized iron powder for laser powder bed fusion*, Journal of Materials Processing Technology, 308, 117705 (2022).
8. Taehyeob Im, Gil-Young Lee, Minhee Son, Caroline Sunyong Lee*, *Introduction of mask-free patterning of metal lines using aerodynamically focused nanoparticle system*, MRS Bulletin, 47, 8, 783-790 (2022).
9. Taehyeob Im, Jungseok Pyo, Jai-sung Lee, Caroline Sunyong Lee*, *Fabrication of homogeneous nanosized nickel powders using a planetary ball mill: Applications to multi-layer ceramic capacitors (MLCCs)*, Powder Technology, 382, 118-125 (2021).
10. Minjong Kim, Taehyeob Im, Gertrude Mugwe Mongella, Nelson Martin Bayi, Caroline Sunyong Lee*, *Evaluation of Sustainability-oriented route to produce CoCrFeNi High-Entropy Alloy Spherical Agglomerates using Hydrogen Reduction*, International Journal of Precision Engineering and Manufacturing-Green Technology (2026).
11. Minseok Kim, Jiseon Kim, Taehyeob Im, Sungjun Choi, Caroline Sunyong Lee*, *Fabrication of color tunable patterns using aerodynamically focused nanoparticle system*, Journal of Manufacturing Processes, 153, 860-867 (2025).
12. Gertrude Mugwe Mongella, Taehyeob Im, Minjong Kim, Caroline Sunyong Lee*, *Reaction kinetics study of hydrogen reduction of high energy milled CoCrFeNi high-entropy alloy (HEA)*, Journal of Materials Research and Technology, 35, 5591-5599 (2025).
13. Heungseok Oh, Hazina Charles, Taehyeob Im, Haritham Khan, Caroline Sunyong Lee*, *Extrusion-based additive manufacturing of three-dimensional MoSe₂-nanosheet-coated TiO₂ hetero-structures for photocatalytic CO₂ reduction*, International Journal of Advanced Manufacturing Technology, 130, 5-6, 3133-3147 (2024).
14. Heungseok Oh, Taehyeob Im, Jungsuk Pyo, Jai-sung Lee, Caroline Sunyong Lee*, *Study of solid loading of feedstock using trimodal iron powders for extrusion based additive manufacturing*, Scientific reports, 13, 4819 (2023).
15. Suhee Kang, Taehyeob Im, Minjeong Koh, Caroline Sunyong Lee*, *Facile fabrication of electrospun black titania nanofibers decorated with graphitic carbon nitride for the application of photocatalytic CO₂ reduction*, Journal of CO₂ Utilization, 41, 101230 (2020).
16. Dahyun Choi, Minhee Son, Taehyeob Im, Sung-Hoon Ahn, Caroline Sunyong Lee*, *Crack-free fabrication of Prussian blue-based blending film for the dramatic enhance-*

- ment of dual electrochromic device*, Ceramics International, 46, 21008–21013 (2020).
17. Dahyun Choi, Minhee Son, Taehyeob Im, Sung-Hoon Ahn, Caroline Sunyong Lee*, *Microstructure control of NiO-based ion storage layer with various sized NiO particles to evaluate the electrochromic performance*, Materials Chemistry and Physics, 249, 123121 (2020).

Intellectual properties (Registered Patents: 7, Pending Applications: 9)

Registered Patents

1. 연자성 코어 및 그의 제조 방법 (등록번호: 10-2844528)
2. 연자성 복합재료, 그의 제조방법, 연자성 복합코어, 및 그의 제조방법 (등록번호: 10-2866176)
3. 압출 방식의 3차원 프린팅 공정용 피드스톡, 그 제조 방법, 및 이를 이용한 3차원 프린팅 공정 (등록번호: 10-2571635)
4. 양면 멀티구동 전기 변색 소자 및 그 제조 방법 (등록번호: 10-2914259)
5. 열계면층을 포함하는 반도체 소자 패키지 및 그 제조 방법 (등록번호: 10-2274190, PCT/KR2019/018092)
6. (International, US Patent) Semiconductor Device Package Comprising Thermal Interface Layer, and Method for Manufacturing the Same (등록번호: 11,232,996)
7. 한 손으로 지퍼를 열고 닫을 수 있도록 보조하는 지퍼 고정 장치, 이의 제조 방법, 및 이를 이용하여 한 손으로 지퍼를 열고 닫는 방법 (등록번호: 20-0499375)

Pending Applications

1. 재료 압출식 3D 프린팅을 이용한 Ni-Zn계 페라이트 자성 코어 제조 방법 및 그 자성 코어 (출원번호: 10-2025-0155063)
2. 고안정성 고엔트로피 양극재 분말 제조 방법 (출원번호: 10-2025-0148463)
3. 연자성 코어 및 그의 제조방법 (출원번호: 10-2025-0111464)
4. 광촉매, 그의 제조방법, 및 광촉매 필터 제조방법 (출원번호: 10-2025-0097034)
5. 고용체, 그의 제조방법, 및 합금 응집체 제조방법 (출원번호: 10-2025-0010839)
6. 저온 구동이 가능한 가스센서에 대한 아두이노 설계 (출원번호: 10-2024-0119768)
7. 광합성 장치 및 그의 제조방법 (출원번호: 10-2023-0182111)
8. 3D 프린팅 기술을 이용한 맞춤형 의족 보조기구 및 이의 제조 방법 (출원번호: 20-2023-0002389)
9. 3차원 프린팅 성형체의 제조방법 및 3차원 프린팅 성형체의 제어방법 (출원번호: 10-2023-0110002)

Fellowship & Honors

Nov. 2024: Oral Session Award, The 8th International Conference on Electronic Materials and Nanotechnology for Green Environment (ENGE)

- Title: Fabrication of Fe-6.5Si-Based Magnetic Cores via Dual-Nozzle Material Extrusion (D-MEX) Technology: Strategies to Improve its Magnetic Properties

Oct. 2023: Outstanding Student Presentation Award, Fall Conference of the Korean Institute of Metals and Materials (KIM)

- Title: Structural Design Focused on Sintering of Fe–Si-Based Soft Magnetic Composites Fabricated via Material Extrusion (MEX)

Mar. 2022: Shinhan Diamond Best Paper Award, Spring Conference of the Korean Powder Metallurgy Institute (KPMI)

- Title: Optimization of Post-Processing Conditions for Improving Sintered Density and Mechanical Properties for Material Extrusion Additive Manufacturing

Aug. 2021: Best Poster Presentation Award, International Conference on Energy, Aqua-tech and Sustainability (ICEAS)

- Title: A strategy in material to address the increasing demand for metal additive manufacturing using economically advantageous water-atomized iron powder

Mar. 2018 – Dec. 2018: Lotte Scholarship Recipient, Lotte Foundation, Korea

Mar. 2018: Harim Scholarship Recipient, Harim Group, Korea

International Conference Presentations

1. **(Invited talk)** *Sinter-Based 3D-Printed Metal-Insulation-Metal (MIM) Structures Using Fe-6.5Si for Soft Magnetic Cores*, International Conference on Emerging Applications of PM & AM Materials and Technologies (EMATec), 2026. (Oral presentation)
2. *Design of 3-Dimensional Soft Magnetic Cores Based on High-Si Fe Alloys for Motor Application*, International Conference on Future of AM, 2025. (Oral presentation)
3. *Fabrication of Fe–6.5Si-Based Magnetic Cores via Dual-Nozzle Material Extrusion (D-MEX) Technology: Strategies to Improve its Magnetic Properties*, International Conference on Electronic Materials and Nanotechnology for Green Environment (ENGE), 2024. (Oral presentation, Oral Session Award)
4. *Novel Approach to Manufacture Fe–6.5Si Cores with MIM Structure via Dual-Nozzle Material Extrusion (MEX) Technology*, Solid Freeform Fabrication (SFF), 2024. (Oral presentation)
5. *Fabrication of Soft Magnetic Composites (SMCs) core via Material Extrusion (MEX) method*, Sintering, 2023. (Poster presentation)
6. *A Study on Material Extrusion-Based High-Si Content Soft Magnetic Composites Design and Optimization*, International Conference on Science & Technology Dea (ICAT), 2022. (Oral presentation)
7. *Novel Fabrication of Fe–Si/SiO₂ Composite Used for Soft Magnetic Core Made by Extrusion-Based Additive Manufacturing*, International Conference on Energy, Aquatech and Sustainability (ICEAS), 2022. (Oral presentation)
8. *Mechanical Evaluation of Laser Powder Bed Fusion (LPBF) Process based 3-D printed parts using partially pre-alloyed water-atomized iron powder (Fe-1.50Cu-1.75Ni-0.50Mo)*, MRS Fall meeting, 2021. (Oral presentation)
9. *A strategy in material to address the increasing demand of metal additive manufacturing*

using economically advantageous water-atomized iron powder, International Conference on Energy, Aquatech and Sustainability (ICEAS), 2021. (Poster presentation, Best Poster Presentation Award)

10. *A study on the patterning method using solvent-free Aerodynamically Focused Nanoparticle (AFN) printing*, International Conference on Electronic Materials and Nanotechnology for Green Environment (ENGE), 2020. (Oral presentation)
11. *Eco-friendly playground tile using 3D printer*, International Conference on Energy and Sustainability (ICES), 2018. (Poster presentation)

Domestic Conference Presentations

1. 다중 재료 압출 적층 제조를 통한 Fe-6.5Si 기반 연자성 코어의 절연 구조 설계 및 3차원 형상 구현, 추계 금속재료학회, 2025. (구두발표)
2. 3D 프린팅 및 방전 플라즈마 소결 복합 공정을 통한 금속-절연체-금속(MIM) 구조 Fe-6.5Si 연자성 코어의 소결 설계, 춘계 한국세라믹학회, 2025. (포스터발표)
3. 불 밀링을 통한 MgO 절연 코팅 Fe-4.5 wt.%Si 코어-셸 구조 연자성 복합재료 개발 및 고주파 (~1 GHz) 특성 평가, 춘계 한국세라믹학회, 2024. (구두발표)
4. 재료 압출 (MEX) 방식으로 제조된 Fe-Si계 연자성 복합재료의 소결 공정 중심 구조 설계, 추계 금속재료학회, 2023 (구두발표, 우수 구두 발표상).
5. 레이저 스캔 전략에 따른 부분 합금화 수분무 Fe-1.50Cu-1.75Ni-0.50Mo 분말 기반 인장 시편의 미세구조 및 잔류 응력 분석, 추계 금속재료학회, 2022. (구두발표)
6. 압출 기반 적층 제조에서 소결 밀도 및 기계적 특성 향상을 위한 전처리 공정 최적화, 춘계 한국분말야금학회, 2022 (구두발표, 신한다이아몬드 우수논문상).
7. 적층 세라믹 커패시터 내부 전극용 나노 니켈 분말의 제조 조건 최적화 및 특성 분석, 추계 금속재료학회, 2019. (구두발표)
8. 적층 세라믹 커패시터 내부 전극용 나노 니켈 분말의 크기 감소 조건 최적화 연구, 춘계 한국세라믹학회, 2019. (포스터발표)