

Gyu-Jang Sim

심규장

Ph.D. Candidate · Computational Mechanics of Materials — Dislocation Dynamics · Crystal Plasticity · Machine Learning

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RESEARCH INTERESTS

3D DDD-FEM modeling · Crystal plasticity FEM (CPFEM) · Fatigue of titanium alloys · GNN surrogate models for fatigue prediction · GND-based back stress & strain-path-change modeling

EDUCATION

Seoul National University — Integrated M.S.-Ph.D., Materials Science & Engineering Mar 2022 – present
Materials Mechanics Laboratory (Advisor: Prof. Myoung-Gyu Lee)

Seoul National University — B.S., Materials Science & Engineering Mar 2014 – Feb 2022

PUBLICATIONS

- G.-J. Sim**, J. You, S. Choi, Y. Kim, C. A. Lee, H. Kim, D. Noh, M.-G. Lee, “Modeling GND-induced back stress and its role in tension-compression behavior of ultra-thin metal sheets,” *Materials & Design* (2026) 115791. doi:10.1016/j.matdes.2026.115791 · IF 8.2
- G.-J. Sim**, M.-G. Lee, M. I. Latypov, “FIP-GNN: Graph neural networks for scalable prediction of grain-level fatigue indicator parameters,” *Scripta Materialia* 255 (2025) 116407. doi:10.1016/j.scriptamat.2024.116407 · IF 5.3
- S. Y. Jo[†], **G.-J. Sim**[†], E. J. Park, J. Park, J. Y. Won, H. Kim, M.-G. Lee, “Effect of solder void on mechanical and thermal properties of flip-chip light-emitting diode: Statistical analysis based on finite element modeling,” *Heliyon* 10 (12) (2024) e33242. doi:10.1016/j.heliyon.2024.e33242 · [†] equal contribution · IF 3.4

RESEARCH EXPERIENCE

DDD-FEM modeling 2025 – present
Seoul National University

CPFEM-based fatigue life modeling of Ti alloys 2025 – present
Seoul National University

Crystal-plasticity prediction of kinematic hardening with grain-size effects 2024 – 2025
Seoul National University · Hyundai Motor Company

GNN prediction of grain-level fatigue indicator parameters 2023 – 2024
Seoul National University · University of Arizona

CONFERENCE PRESENTATIONS

- ORAL** IDDRG 2026 (45th International Deep Drawing Research Group Conference), IIT Bombay, Mumbai, India — “A Grain-Size-Dependent Back-Stress Model for Hall-Petch and Bauschinger Effects in Ultra-Thin Sheets” (IDDRG624) (Jun 2026)
- ORAL** TMS 2025 Annual Meeting, Las Vegas, USA — “Prediction of Fatigue Indicator Parameter by Graph Neural Network” (Mar 2025)
- ORAL** 한국소성·가공학회 춘계학술대회 — “탄·소성 및 파단 물성 확보 위한 유한요소해석 자동화” (May 2023)
- POSTER** 제9회 고부가 금속소재 연구 및 교육 심포지엄 — “유한요소해석의 반복적 실행을 통한 FLD0의 시편 형상 조건 최적화 방법” (Oct 2022)

HONORS & AWARDS

Samsung Electronics DS Division Ph.D. Scholarship (박사장학생) Samsung Electronics · 2025 –
Grand Prize (최우수상), 2nd Steel & Metal Idea Contest Korea Iron & Steel Association · Oct 2022

TECHNICAL SKILLS

Simulation Abaqus (UMAT / VUMAT / UEL / VUEL), ParaDiS (C++ source-level development), WARP3D, CPFEM RVE workflows, DDD-FEM coupling

Data & ML Graph neural networks, feature engineering, hyperparameter optimization, extreme-value statistics for fatigue

Tools ParaView, EBSD/microstructure processing, DREAM.3D, Git, HPC/Linux environments