

Curriculum Vitae

Name: **Kim, Han Seul**

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Work Experience

- Mar. 2023 – Current** **Assistant Professor**, Department of Advanced Material Engineering, Chungbuk National University
- Oct. 2017 – Feb. 2023** **Senior Researcher**, Center for Supercomputing Applications, Division of Supercomputing R&D, Korea Institute of Science and Technology Information (KISTI)
- Mar. 2021 – Feb. 2022** **Associate Adjunct Professor**, Department of Data & High Performance Computing Science, University of Science & Technology (UST)
- Mar. 2017 – Sep. 2017** **Post Doc. Researcher**, Graduate School of Energy, Environment, Water and Sustainability (EEWS), Korea Advanced Institute of Science and Technology (KAIST)

Educations

- Mar. 2013 – Feb. 2017** **Ph.D.**, Graduate School of Energy, Environment, Water and Sustainability (EEWS), Korea Advanced Institute of Science and Technology (KAIST)
- GPA: 4.26/4.3, Thesis with Prof. Yong-Hoon Kim “Development of a multispace constrained density functional theory for non-equilibrium quantum transport simulations”
- Mar. 2011 – Feb. 2013** **M.S.**, Graduate School of Energy, Environment, Water and Sustainability (EEWS), Korea Advanced Institute of Science and Technology (KAIST)

GPA: 4.3/4.3, Thesis with Prof. Yong-Hoon Kim “First-principles study of charge transport in interfaces based on carbon nanomaterials for device applications”

Mar. 2007 – Feb. 2011 **B.S.**, Department of Materials Science and Engineering, University of Seoul (UOS)

GPA: 4.45/4.5 within 7 semesters, Summa Cum Laude

Honors and Awards

2022 Excellent Research Award by National Research Council of Science and Technology (NST)

2022 Excellent Research Award by Korea Institute of Science and Technology Information (KISTI)

2019 Excellent Young Researcher Award by KISTI

2013.03 - 2016.02 Global Ph. D. Fellowship awarded by National Research Foundation of Korea (NRF)

Research interests

1. First-principles studies on the electronic properties of novel low-dimensional materials

- Materials: Two-dimensional (2D) materials, 2D-like polymers, Low-dimensional perovskite materials, organic electronic materials, and their hetero-interfaces.
- Properties: Quantum electron transport, charge transfer, optical properties, molecular dynamics at the interface, electrochemical properties, (bio)sensing, and many more.

2. Multiscale simulations on the smart electronic devices based on novel materials

- Multi-bit & multi-value memory devices for semiconductor chips with low power consumptions
- Memristors for neuromorphic device applications

3. Developments of novel simulation methods & practical applications to industries

- Development of intuitive multiscale simulation methods for the direct application to industries

- PI of “Sync” and “Sync-OLED” projects: Super-easy and highly-standardized multiscale simulation platforms on advanced materials for industrial purpose (<https://sync-oled.edison.re.kr/>)

Recent publications (2020~)

1. D Lee, SJ Lee, JH Kim, G Kim, WG Jung, J Park, YC Kang, YH Kim, M Song*, **HS Kim***, JW Choi*, Multi-ion controllable metal halide ionic structure for selective short- and long-term memorable synaptic devices, Nano Today, 55, 102184 (2024)
2. D Kim, G Cho, YH Kim, JH Kwon, Y Oh, M Yang, S Jee, IS Lee, MJ Si, Y Jung, HY Yang, Y Ahn, BK Kim, C Kim, **HS Kim***, SW Baek*, Multi-Facet Passivation of Ternary Colloidal Quantum Dot Enabled by Quadruple-Ligand Ensemble toward Efficient Lead-Free Optoelectronics. Adv. Energy Mater. 2302579 (2024) [Cover]
3. SJ Kang, W Jung, OH Gwon, **HS Kim**, HR Byun, JY Kim, SG Jang, B Shin, O Kwon, B Cho, K Yim, YJ Yu, Photo-Assisted Ferroelectric Domain Control for α - In_2Se_3 Artificial Synapses Inspired by Spontaneous Internal Electric Fields. Small, 2307346 (2024)
4. J Kim, JW Lim*, **HS Kim***, Synaptic devices for simulating brain processes in visual-information perception to persisting memory through attention mechanisms, Mater. Today Adv. 20, 100421 (2023)
5. TG Yun[†], J Lee[†], **HS Kim**[†], JY Cheong, SH Kim, Y Kim*, S Lee, ID Kim*, π -Bridge Spacer Embedded Electron Donor-Acceptor Polymer for Flexible Electrochromic Zn-ion Batteries, Adv. Mater. 2301141 (2023) [[†] equal contributions, Cover]
6. Y Hwang, B Park, S Hwang, SW Choi, **HS Kim**, AR Kim, JW Choi, J Yoon, JD Kwon*, Y Kim*, A Bioinspired Ultra Flexible Artificial van der Waals 2D-MoS₂ Channel/LiSiO_x Solid Electrolyte Synapse Arrays via Laser-Lift Off Process for Wearable Adaptive Neuromorphic Computing, Small Methods, 2201719 (2023)
7. JI Choi, C Johnson, N Fomina, A Darvish, C Lang, YS Shin*, **HS Kim***, SS Jang*, Electron Transport through Nanoconfined Ferrocene Solution: Density Functional Theory—Nonequilibrium Green Function

Approach, *J. Phys. Chem. C* 127, 2666–2674 (2023)

8. MS Ramzan, AB Kuc*, **HS Kim***, Electronic fingerprint mechanism of NO_x sensor based on single-material SnP₃ logical junction, *npj Comput. Mater.* 8, 220 (2022)

9. OH Gwon, SG Jang, JY Kim, **HS Kim**, YJ Yu*, Electron Tunneling Enhancement in MoS₂/Hexagonal Boron Nitride/Multilayer Graphene Heterostructures by Bubble Formation, *Appl. Sci. and Conv. Technol.* 31 (5), 110-112 (2022)

10. D Lee, SJ Lee, JH Kim, J Park, YC Kang, M Song, HW Lee, **HS Kim*** and JW Choi*, Multimodal Gas Sensor Detecting Hydroxyl Groups with Phase Transition Based on Eco-Friendly Lead-Free Metal Halides, *Adv. Funct. Mater.* 32, 2202207 (2022) [Inside front cover]

11. HK Choi, J Park, OH Gwon, JY Kim, SJ Kang, HR Byun, BK Shin, SG Jang, **HS Kim*** and YJ Yu*, Gate-Tuned Gas Molecule Sensitivity of a Two-Dimensional Semiconductor, *ACS Appl. Mater. Interfaces* 14, 20, 23617–23623 (2022)

12. OH Gwon†, JY Kim†, **HS Kim†**, SJ Kang, M Park, DS Lee, YJ Kim, S Ahn, J Kim, SJ Cho and YJ Yu*, Systematic design and demonstration of multi-bit generation in layered materials heterostructures floating-gate memory, *Adv. Funct. Mater.* 31, 2105472 (2021) [† equal contributions] [Inside front cover]

13. **HS Kim***, Computational design of a switchable heterostructure electrocatalyst based on a two-dimensional ferroelectric In₂Se₃ material for the hydrogen evolution reaction, *J. Mater. Chem. A* 9, 11553 (2021)

14. Y Nah, O Allam, **HS Kim**, JI Choi, IS Kim, J Byun, SO Kim, SS Jang*, and DH Kim*, Spectral Instability of Layered Mixed Halide Perovskites Results from Anion Phase Redistribution and Selective Hole Injection, *ACS Nano* 15, 1, 1486–1496 (2021)

15. J Lee, **HS Kim**, YH Kim, Multi-Space Excitation as an Alternative to the Landauer Picture for Nonequilibrium Quantum Transport, *Adv. Sci.* 7 (16), 2001038 (2020)

16. JI Choi†, **HS Kim†**, YS Shin, C Johnson, N Fomina, P Staley, C Lang, and SS Jang*, Electron-Transport Characteristics through Aluminum Oxide (100) and (012) in a Metal–Insulator–Metal Junction System: Density Functional Theory—Nonequilibrium Green Function Approach, *ACS omega* 5 (3), 1717-1724 (2020) [† equal contributions]