Dr. Sungho Jeon

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Research Interest

TEM, Computer Vision, Machine Learning, Catalyst, MEMS

Experience

University of Pennsylvania **Sep 2021-Present**
Postdoc, Material Science and Engineering
- Developed characterization method for molecular catalysts on semiconductor materials (*Matter*, 2024)
- Studied the stability of catalysts under reaction for fuel cell (*Cell Reports*, 2024)
- Characterized various catalysts, electronic devices, and battery materials.

Hanyang University **Aug 2017-Aug 2021**
Postdoc, Mechanical Engineering Department
- Studied the nucleation process of gold nanoparticles (*Science*, 2021)
- Developed advanced liquid cell for efficient *in situ* TEM data acquisition (*Advanced Materials*, 2020)
- Simulated and analyzed TEM images

Education

University of Tokyo GPA: 3.70/4.00 (JSPS fellowship) **Apr 2014-Mar 2017**
Dr. Eng. in Electrical Engineering and Information Systems
Dissertation: Development of free space optical communication system using a MEMS scanner

University of Tokyo GPA: 3.88/4.00 (SEUT scholarship) **Apr 2012-Mar 2014**
M.S. in Electrical Engineering and Information Systems
Thesis: Development of interactive display using a MEMS scanner

University of Tokyo GPA: 3.02/4.00 (Full scholarship) **Apr 2008-Mar 2012**
B.S. in Electrical and Electronic Engineering
Thesis: Effect of surface roughness of Si wafer on the mobility of MOSFET

Technique

- Transmission electron microscopy (HAADF, EELS, 4D-STEM, Ptychography)
- Other characterization (SEM, AFM, Ellipsometry)
- Microfabrication
- Computer Vision
- Software languages (Python, MATLAB, R, LabView, C)
- Circuit, Embedded systems
- English, Japanese, Korean

Publications

First authored papers

1. Ψ Jeon, S., Ψ Nedzbala, H. S., Huffman, B. L., Pearce, A. J., Donley, C. L., Jia, X., Bein, G. P., Choi, J., Durand, N., & Atallah, H. (2024). Statistical Analysis of HAADF-STEM Images to Determine the Surface Coverage and Distribution of Immobilized Molecular Complexes. *Matter, 101919.*
2. Ψ Liu, C., Ψ Jung, W., Ψ Jeon, S., Johnson, G., Shi, Z., Xiao, L., ... & Mallouk, T. E. (2024). Stabilizing alkaline fuel cells with a niobium-doped brookite titanium dioxide catalyst support. *Cell Reports Physical Science. 5(7), 102090.*
3. Ψ Jeon, S., Ψ Heo, T., Ψ Hwang, S. Y., Ciston, J., Bustillo, K. C., Reed, B. W., Ham, J., Kang, S., Kim, S., & Lim, J. (2021). Reversible disorder-order transitions in atomic crystal nucleation. *Science, 371(6528), 498-503.*
4. Ψ Lim, K., Ψ Bae, Y., Ψ Jeon, S., Kim, K., Kim, B. H., Kim, J., Kang, S., Heo, T., Park, J., & Lee, W. C. (2020). A Large-Scale Array of Ordered Graphene-Sandwiched Chambers for Quantitative Liquid-Phase Transmission Electron Microscopy. *Advanced Materials*, *32*(39), 2002889.
5. Jeon, S., & Toshiyoshi, H. (2017). MEMS tracking mirror system for a bidirectional free-space optical link. *Applied optics, 56(24), 6720-6727.*
6. Jeon, S., Fujita, H., & Toshiyoshi, H. (2015). A MEMS-based interactive laser scanning display with a collocated laser range finder. *IEICE Electronics Express, 12(10), 20150072-20150072.*
7. Jeon, S. H., Taoka, N., Matsumoto, H., Nakano, K., Koyama, S., Kakibayasi, H., Araki, K., Miyashita, M., Izunome, K., & Takenaka, M. (2013). Impacts of Surface Roughness Reduction in (110) Si Substrates Fabricated by High-Temperature Annealing on Electron Mobility in n-Channel Metal–Oxide–Semiconductor Field-Effect Transistors on (110) Si. *Japanese Journal of Applied Physics, 52(4S), 04CC26.*

Ψ These authors contributed equally to the work.

Other papers

1. Lee, H. H., Choi, J. H., Kim, D. S., Jeon, S., Stach, E. A., & Cho, H. K. (2024). Electrochemical Glycerol Valorization Using Tolerant Pt Embedded Bi Platform Electrocatalysts Derived from Photoactive Bismuth Oxyiodide Nanosheet Intermediates. *EcoMat, e12504.*
2. Wang, H., Shang, B., Choi, C., Jeon, S., Gao, Y., Wang, T., ... & Wang, H. (2024). Enhanced methanol production from photothermal CO_2 reduction via multilevel interface design. *Nano Research.*
3. Choi, J. H., Lee, H. H., Jeon, S., Sarker, S., Kim, D. S., Stach, E. A., & Cho, H. K. (2024). Photoilluminated Redox-Processed Rh2P Nanoparticles on Photocathodes for Stable Hydrogen Production in Acidic Environments. *ACS Applied Materials & Interfaces 16(17), 21953-21964.*
4. Jia, X., Stewart-Jones, E., Alvarez-Hernandez, J. L., Bein, G. P., Dempsey, J. L., Donley, C. L., ... & Powers, R. E. (2024). Photoelectrochemical CO_2 Reduction to CO Enabled by a Molecular Catalyst Attached to High-Surface-Area Porous Silicon. *Journal of the American Chemical Society, 146(12), 7998-8004.*
5. Shang, B., Zhao, F., Suo, S., Gao, Y., Sheehan, C., Jeon, S., ... & Wang, H. (2024). Tailoring Interfaces for Enhanced Methanol Production from Photoelectrochemical CO_2 Reduction.

Journal of the American Chemical Society, 146(3), 2267-2274.

6. Yu, Y., Levine, M. I., Yang, Z., Jeon, S., Stach, E. A., & Xie, J. (2023). Boosting the Low-Temperature Performance of Graphite Anodes by Creating an Electrochemically Active Interface. *ACS Applied Energy Materials, 6(24), 12371-12378.*
7. Gong, Q., Zhang, H., Yu, H., Jeon, S., Ren, Y., Yang, Z., Sun, C. J., Stach, E. A., Foucher, A. C., & Yu, Y. (2023). Amino-tethering synthesis strategy toward highly accessible sub-3-nm L10-PtM catalysts for high-power fuel cells. *Matter, 6(3), 963-982.*
8. McGuigan, S., Tereniak, S. J., Donley, C. L., Smith, A., Jeon, S., Zhao, F., Sampaio, R. N., Pauly, M., Keller, L., & Collins, L. (2023). Discovery of a Hybrid System for Photocatalytic CO2 Reduction via Attachment of a Molecular Cobalt-Quaterpyridine Complex to a Crystalline Carbon Nitride. *ACS Applied Energy Materials, 6(20), 10542-10553.*
9. Song, S., Jeon, S., Rahaman, M., Lynch, J., Rhee, D., Kumar, P., Chakravarthi, S., Kim, G., Du, X., & Blanton, E. W. (2023). Wafer-scale growth of two-dimensional, phase-pure InSe. *Matter, 6(10), 3483-3498.*
10. Vance, B. C., Najmi, S., Kots, P. A., Wang, C., Jeon, S., Stach, E. A., Zakharov, D. N., Marinkovic, N., Ehrlich, S. N., & Ma, L. (2023). Structure–Property Relationships for Nickel Aluminate Catalysts in Polyethylene Hydrogenolysis with Low Methane Selectivity. *JACS Au, 3(8), 2156-2165.*
11. Wang, H., Fu, S., Shang, B., Jeon, S., Zhong, Y., Harmon, N. J., Choi, C., Stach, E. A., & Wang, H. (2023). Solar-Driven CO_2 Conversion via Optimized Photothermal Catalysis in a Lotus Pod Structure. *Angewandte Chemie, e202305251.*
12. Jia, X., Cui, K., Alvarez-Hernandez, J. L., Donley, C. L., Gang, A., Hammes-Schiffer, S., Hazari, N., Jeon, S., Mayer, J. M., & Nedzbala, H. S. (2023). Synthesis and Surface Attachment of Molecular Re (I) Hydride Species with Silatrane Functionalized Bipyridyl Ligands. *Organometallics, 42(16), 2238-2250.*
13. Kim, J., Park, A., Kim, J., Kwak, S. J., Lee, J. Y., Lee, D., Kim, S., Choi, B. K., Kim, S., & Kwag, J. (2022). Observation of H2 Evolution and Electrolyte Diffusion on MoS2 Monolayer by In Situ Liquid-Phase Transmission Electron Microscopy. *Advanced Materials, 34(45), 2206066.*
14. Kang, M. H., Park, J., Kang, S., Jeon, S., Lee, M., Shim, J. Y., Lee, J., Jeon, T. J., Ahn, M. K., & Lee, S. M. (2021). Graphene Oxide-Supported Microwell Grids for Preparing Cryo-EM Samples with Controlled Ice Thickness. *Advanced Materials, 33(43), 2102991.*
15. Bae, Y., Kang, S., Kim, B. H., Lim, K., Jeon, S., Shim, S., Lee, W. C., & Park, J. (2021). Nanobubble dynamics in aqueous surfactant solutions studied by liquid-phase transmission electron microscopy. *Engineering, 7(5), 630-635.*
16. Bae, Y., Lim, K., Kim, S., Kang, D., Kim, B. H., Kim, J., Kang, S., Jeon, S., Cho, J., & Lee, W. B. (2020). Ligand-dependent coalescence behaviors of gold nanoparticles studied by multichamber graphene liquid cell transmission electron microscopy. *Nano Letters, 20(12), 8704-8710.*
17. Yang, J., Koo, J., Kim, S., Jeon, S., Choi, B. K., Kwon, S., Kim, J., Kim, B. H., Lee, W. C., & Lee, W. B. (2019). Amorphous-phase-mediated crystallization of Ni nanocrystals revealed by high-resolution liquid-phase electron microscopy. *Journal of the American Chemical Society, 141(2), 763-768.*
18. Kim, J. I., Jeon, S., & Lee, W. C. (2019). Fully Stretchable Electromagnet Using Magnetoactive PDMS Sponges and Metallic Coils. *JOM, 71(12), 4556-4561.*
19. Jang, J., Lee, Y., Yoon, J. Y., Yoon, H. H., Koo, J., Choe, J., Jeon, S., Sung, J., Park, J., & Lee, W. C. (2018). One-dimensional assembly on two-dimensions: AuCN nanowire epitaxy on graphene for hybrid phototransistors. *Nano Letters, 18(10), 6214-6221.*

Selected Conference

1. Ham, J., Lee, Y., Kim, J., Lim, K., Lee, S., Jeon, S., ... & Lee, W. C. (2019, January). Facile Identification of Graphene's Crystal Orientations by Optical Microscopy of Self-Aligned Microwires. In *2019 IEEE 32nd International Conference on Micro Electro Mechanical Systems (MEMS)* (pp. 264-265). IEEE.
2. Lim, K., Bae, Y., Kim, K., Jeon, S., Kim, B. H., Park, J., & Lee, W. C. (2019, January). Self-Assembled Nanochamber Arrays for in-situ TEM Observation of Liquid-Phase Samples. In *2019 IEEE 32nd International Conference on Micro Electro Mechanical Systems (MEMS)* (pp. 105-106). IEEE.
3. Jeon, S., & Toshiyoshi, H. (2017, January). A bi-directional free-space optical communication system with MEMS spatial light modulator for Aglie data link. In *2017 IEEE 30th International Conference on Micro Electro Mechanical Systems (MEMS) (*pp. 297-300). IEEE.
4. Toshiyoshi, H., Jeon, S., & Fujita, H. (2015, June). A mems-based interactive laser scanning display with a built-in laser range finder. In *2015 Transducers-2015 18th International Conference on Solid-State Sensors, Actuators and Microsystems (TRANSDUCERS)*. IEEE.
5. Jeon, S., Fujita, H., & Toshiyoshi, H. (2013, August). A MEMS interactive laser projection display with a built-in laser range finder. *In 2013 International Conference on Optical MEMS and Nanophotonics (OMN) (pp. 15-16).* IEEE.

Funding/Scholarship information

2015 – 2017	JSPS Research Fellowships for Young Scientists (Research grant (Grant-in-Aid for JSPS Fellows): ¥ 1.5 million/year)
2014 – 2015	The University of Tokyo Doctoral Student Special Incentives Program (Outstanding Candidates)
2008 – 2012	Korea-Japan Joint Government Scholarship Program (4-year full scholarship)