Woo Je Chang, Ph. D.

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Education

Northwestern University, Ph.D. in Materials Science and Engineering — Sep 2017 – Aug 2022
Thesis: Doping Semiconductor Nanocrystals to Modify their Electronic Properties

Seoul National University, M.S. in Bioengineering — Mar 2014 – Feb 2016
Thesis: Design of Electrolyzer System and Photocatalyst Material for Solar Fuel

Seoul National University, B.S. in Materials Science and Engineering — Mar 2010 – Feb 2014

Research Experiences

The University of Texas at Austin, McKetta Department of Chemical Engineering — Austin, TX
Post-Doctoral Fellow (Advisor: **Delia Milliron**) — Aug 2022 –

Northwestern University, Department of Chemistry — Evanston, IL
Kwanjeong Educational Foundation Graduate Fellow (Advisor: **Emily Weiss**) — Jan 2018 – Jun 2022

Tokyo Institute of Technology, Earth Life Science Institute — Tokyo, Japan
Visiting Researcher — Aug 2016 – Feb 2017

Seoul National University, Department of Materials Science and Engineering — Seoul, South Korea
Master Student Researcher (Advisor: **Ki Tae Nam**) — Mar 2014 – May 2016

Research Interest

Light Conversion for Sustainable Fuels, Photovoltaics, Quantum Information Transduction, Nanophotonics, Photonic Logic Gates, Chemistry from Photonic Structure, Material Sensing

Awards and Honors

Kwanjeong Educational Foundation Scholarship (Full funding of stipends for 5 years after nationwide competition) — Sep 2017 – Jun 2022

KSEA-KUSCO Graduate Scholarship — Sep 2021

SNU Alumni Association in Chicago Area Scholarship — Dec 2018

Publications

1st author

1) Chang, W.J.; Roman, B.J.; Paul, T.; Sakotic, Z.; Vora, P.; Kim, K.; Hurst, L.E.; Wasserman, D.; Truskett, T.M.; Milliron, D.J. Ultrastrong Coupling by Assembling Plasmonic Metal Oxide Nanocrystals in Open Cavities, *ACS Nano* **2025** DOI: 10.1021/acsnano.5c01913
2) Chang, W.J.; Green, A.M.; Sakotic, Z.; Wasserman D.; Truskett, T.M.; Milliron D.J. Plasmonic Metal Oxide Nanocrystals as Building Blocks for Infrared Metasurfaces, *Acc. Mater. Res.* **2025** *6*, 104-113
3) Chang, W.J.; Roman, B.J.; Green, A.M.; Truskett, T.M.; Milliron, D.J. Surface-Enhanced Infrared Absorption Spectroscopy by Resonant Vibrational Coupling with Plasmonic Metal Oxide Nanocrystals, *ACS Nano* **2024**, *18*, 20636-20647
4) Chang, W.J.†; Zeng, H.†; Terry-Weatherly, C.K.†; Provazza, J.; Liu, P.; Weiss, E.A.; Stern, N.P.; Tempelaar, R. Dark State Concentration Dependent Emission and Dynamics of CdSe Nanoplatelet Exciton-Polaritons. *ACS Nano* **2024**, *18*, 20226-20235
5) Chang, W.J.†; Sakotic, Z.†; Ware, A.; Green, A.M.; Roman, B.J.; Kim, K.; Truskett, T.M.; Wasserman, D.; Milliron, D.J. Wavelength Tunable Infrared Perfect Absorption in Plasmonic Nanocrystal Monolayers. *ACS Nano* **2024**, *18*, 972–982.
6) Chang, W.J.; Irgen-Gioro, S.; Vong, A.F.; Kim, H.; Mara, M.W.; Chen, L.X.; Weiss, E.A. Enhancement of Emission from Lanthanide Dopants in Perovskite Nanocrystals through a Temperature-Dependent Phase Transformation of the Perovskite Lattice. *J. Phys. Chem. C* **2022**, *126*, 15247–15253.
7) Chang, W.J.†; Irgen-Gioro, S.†; Padgaonkar, S.; Lopez-Arteaga, R.; Weiss, E.A. Photoredox-Mediated Sensitization of Lanthanide Dopants by Perovskite Nanocrystals. *J. Phys. Chem. C* **2021**, *125*, 25634-25642.

8) Chang, W.J.†; Park, K.-Y.†; Zhou, Y.; Wolverton, C.; Hersam, M.C.; Weiss, E.A. n-Doping of Quantum Dots by Lithium Ion Intercalation. *ACS Appl. Mater. Interfaces* **2020**, *12*, 36523-36529.
9) Chang, W.J.; Lee, K.-H.; Ha, J.-I.; Nam, K.T. Hydrogen Production via Water Electrolysis: The Benefits of a Solar Cell-Powered Process. *IEEE Electric. Mag.* **2018**, *6*, 19-25.
10) Chang, W.J.; Lee, K.-H.; Ha, H.; Jin, K.; Kim, G.; Hwang, S.-T.; Lee, H.-M.; Ahn, S.-W.; Yoon, W.; Seo, H.; Hong, J.S.; Go, Y.K.; Ha, J.-I.; Nam, K.T. Design Principle and Loss Engineering for Photovoltaic–Electrolysis Cell System. *ACS Omega* **2017**, *2*, 1009-1018.
11) Park, S.†; Chang, W.J.†; Lee, C.W.; Park, S.B.; Ahn, H.-Y.; Nam, K.T. Photocatalytic Hydrogen Generation from Hydriodic Acid using Methylammonium Lead Iodide in Dynamic Equilibrium with Aqueous Solution. *Nat. Energy* **2016**, *2*, 16185 – selected as a cover.

Co-authored

1) Green, A.M.; Chang, W.J.; Sherman, Z.M.; Sakotic, Z.; Kim, K.; Wasserman, D.; Milliron, D.J.; Truskett, T.M. Structural Order and Plasmonic Response of Nanoparticle Monolayers. *ACS Photonics* **2024**, *11*, 1280-1292.
2) Kim, K.; Sherman, Z.M.; Cleri, A.; Chang, W.J.; Maria, J.-P.; Truskett, T.M.; Milliron, D.J. Hierarchically Doped Nanocrystal Metamaterials. *Nano Lett.* **2023**, *23*, 7633–7641.
3) Zeng, H.; Liu, P.; Eckdahl, C.; Pérez-Sánchez, J.; Chang, W.J.; Weiss, E.A.; Kalow, J.; Yuen-Zhou, J.; Stern, N.P. Control of Photoswitching Kinetics with Strong Light-Matter Coupling in a Cavity. *J. Am. Chem. Soc.* **2023**, *145*, 19655-19661.
4) Choo, P.; Arenas-Esteban, D.; Jung, I.; Chang, W.J.; Weiss, E.A.; Bals, S.; Odom, T.W. Investigating Reaction Intermediates During the Seedless Growth of Gold Nanostars using Electron Tomography. *ACS Nano* **2022**, *16*, 4408-4414.
5) Irgen-Gioro, S.; Yang, M.; Padgaonkar, S.; Chang, W.J.; Zhang, Z.; Nagasing, B.; Jiang, Y.; Weiss, E.A. Charge and Energy Transfer in the Context of Colloidal Nanocrystals. *Chem. Phys. Rev.* **2020**, *1*, 011305.
6) Lee, B.-H.; Park, S.; Kim, M.; Sinha, A. K.; Lee, S. C.; Jung, E.; Chang, W.J.; Lee, K.-S.; Kim, J.H.; Cho, S.-P.; Kim, H.; Nam, K.T.; Hyeon, T. Reversible and Cooperative Photoactivation of Single-Atom Cu/TiO2 Photocatalysts. *Nat. Mater.* **2019**, *18*, 620-626.
7) Lee, J.; Yun, J.; Kwon, S. R.; Chang, W.J.; Nam, K.T.; Chung, T.D. Reverse Electrodialysis-Assisted Solar Water Splitting. *Sci. Rep.* **2017**, *7*, 1-9.
8) Kale, V.S.; Sim, U.; Yang, J.; Jin, K.; Chae, S.I.; Chang, W.J.; Sinha, A. K.; Ha, H.; Hwang, C.-C.; An, J.; Kong, H.-K.; Lee, Z.; Nam, K.T.; Hyeon, T. Sulfur-Modified Graphitic Carbon Nitride Nanostructures as an Efficient Electrocatalyst for Water Oxidation. *Small* **2017**, *13*, 1603893.
9) Kim, Y.; Shin, D.; Chang, W.J.; Jang, H.L.; Lee, C.W.; Lee, H.E.; Nam, K.T. Hybrid Z-Scheme Using Photosystem I and BiVO4 for Hydrogen Production. *Adv. Funct. Mater.* **2015**, *25*, 2369-2377.

Patent

1) Nam, K.T.; Ha, J.-I.; Chang, W.J.; Lee, K.-H.; Real-Time Optimized Solar Energy-Carbon Dioxide Reduction System", Patent No: PCT/KR2018/005793

Presentations & Academic Services

Invited Talks

1) **The University of Arizona**, Dept. of Chemical & Environmental Engineering — Feb 2025
"Multiscale Interactions of Colloidal Semiconducting Nanocrystals"
2) **Seoul National University**, School of Transdisciplinary Innovations — May 2024
"Light Selective Catalysis for Sustainability"
3) **Korea University**, Dept. of Materials Science & Engineering — Apr 2024
"Light Selective Catalysis for Sustainability"
4) **Pohang University of Science and Technology**, Dept. of Chemistry — Dec 2023
"Engineering Nanocrystals Towards Optical Quantum Information Applications"
5) **Seoul National University**, Dept. of Materials Science & Engineering — Jul 2022
"Engineering Nanocrystals Towards Optical Quantum Information Applications"

Contributed

1) **Materials Research Society Fall Meeting** — Nov 2024
"Infrared Perfect Absorption in Plasmonic Nanocrystal Monolayers" (faculty candidate poster, a talk)

2) **American Institute of Chemical Engineers Annual Meeting** Oct 2024
"Wavelength Tunable Infrared Perfect Absorption in Plasmonic Nanocrystal Monolayers" (faculty candidate poster, talks)
3) **Gordon Research Conference, Plasmonics and Nanophotonics** Jul 2024
"Metal Oxide Nanocrystals as Plasmonic Templates for Enhancing Non-linear Optical Behavior"
4) **American Chemical Society Spring Meeting** Aug 2023
"Tuning Molecular Vibration with Plasmonic NC by Resonant Coupling: A Study Using Tin-Doped Indium Oxide Nanocrystals"
5) **American Chemical Society Spring meeting** Mar 2022
"Polariton Emission Pathway from CdSe Nanoplatelets Based Optical Cavity"
6) **SPIE Optics + Photonics** Aug 2021
"Charge Transfer-Mediated Sensitization of Lanthanide Dopants by Perovskite Quantum Dots."
7) **Materials Research Society Fall Meeting** Nov 2021
"N-Doping of Quantum Dots by Lithium-Ion Intercalation"
8) **Earth Life Science Institute 5th Symposium** Feb 2017
"Life from Hydrothermal Vents? Reducing CO_2 to Organics with the Nernstian Potential Difference"
9) **Materials Research Society Fall Meeting** Mar 2016
"Methylammonium Lead Iodide Photocatalyst in Aqueous Solution for Hydrogen Evolution"
10) **International Conference on Photochemistry** Jun 2015
"Flow Electrolyzer for Efficient Water Splitting"

Peer Review Services
Nano Letters, Jove, ACS Nano, Applied Physics Letters, Nanophotonics

Leadership Experiences

1) **STEM Girls Day**, The University of Texas at Austin Feb 2025
Volunteering for coding and science fair sessions for K-12 students interested in the STEM field
2) **STEM Muse**, Austin Area Sep 2023 -
Mentoring a women undergraduate student in STEM field for her career development
3) **My Introduction to Engineering**, The University of Texas at Austin Jul 2023, Jul 2024
Assistant for hands-on lab session. Making nanomaterials for class-demo
4) **Quantum Information Science Subgroup Leader**, Northwestern University Jun 2021 – Jun 2022
As a part of *Center for Molecular Quantum Transduction (CMQT)*
5) **Materials Science Umbrella Society**, Northwestern University Dec 2019 – Jun 2022
President of the Materials Research Society at Northwestern University
6) **Korean Student Association**, Northwestern University Sep 2020 – Sep 2020
President for raised $2K to fund networking events and seminars for over 200 Korean students

Teaching

Teaching Assistants
1) **Physics of Materials (Mat Sci 351)**, Northwestern University Jan 2021 - Mar 2021
Supported online-based lab sessions with portable oscilloscopes
2) **Materials Science Principle (Mat Sci 301)**, Northwestern University Mar 2019 - May 2021
Instructed lab sessions of 25 students based on the self-designed laboratory section