Woo Je Chang, Ph.D.

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EDUCATION

Northwestern University, *Ph.D. in Materials Science and Engineering* — *Sep 2017 - Jun 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. Materials Science and Engineering/Cum Laude* — *Mar 2010 - Feb 2014*

RESEARCH EXPERIENCE

The University of Texas at Austin, *McKetta Department of Chemical Engineering* — *Austin, TX*
Post-Doctoral Fellow — *Aug 2022 –*
Advisor: Delia J. Milliron
Northwestern University, *Department of Chemistry* — *Evanston, IL*
Kwanjeong Educational Foundation Graduate Fellow — *Jan 2018 – Jun 2022*
Advisor: Emily A. Weiss / Committee: Mark C. Hersam, James M. Rondinelli, Mercouri Kanatzidis
Tokyo Institute of Technology, *Earth Life Science Institute* — *Tokyo, Japan*
Vising Researcher — *Aug 2016 – Feb 2017*
Seoul National University, *Department of Materials Science and Engineering* — *Seoul, South Korea*
Master Student Researcher — *Mar 2014 – May 2016*
Advisor: Ki Tae Nam

RESEARCH INTEREST

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

AWARDS AND HONORS

- Kwanjeong Educational Foundation Scholarship, 2017 – 2022 (Full funding of stipends for 5 years of graduate school, Award after the nationwide competition)
- KSEA-KUSCO Graduate Scholarship, 2021
- SNU Alumni Association in Chicago Area Scholarship, 2018

PUBLICATIONS

1st author

1) **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**, DOI: 10.1021/acsnano.4c06145
2) **Chang, W.J.**†; Zeng, H.†; Terry-Weatherly, C.†; 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**, DOI: 10.1021/acsnano.4c03545
3) **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
4) **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

5) **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
6) **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. Interf.* **2020**, *12*, 36523-36529
7) **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
8) **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,
9) 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*, 1-8 – **selected as a cover**

Co-authored (Post-doctoral work underlined)

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/TiO_2 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 $BiVO_4$ for Hydrogen Production. *Adv. Funct. Mater*. **2015**, *25*, 2369-2377

Patents

- 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

Invited Talks

- Seoul National University, School of Transdisciplinary Innovations *May 2024*
  "Light Selective Catalysis for Sustainability"
- Korea University, Department of Materials Science and Engineering *Apr 2024*
  "Light Selective Catalysis for Sustainability"
- Pohang University of Science and Technology, Department of Chemistry *Dec 2023*
  Organized Nanostructure as a Platform for Non-Linear Optical Response"
- Korea Institute of Science and Technology, Center for Nanophotonics, *Jul 2022*
  "Engineering Nanocrystals Towards Optical Quantum Information Applications"
- Seoul National University, Department of Materials Science and Engineering, *Jul 2022*

"Engineering Nanocrystals Towards Optical Quantum Information Applications"

Contributed

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

Peer Reviewing Services

- Nano Letters, Jove, ACS Nano

MENTORING

- Priyansh Vora (Undergraduate, The University of Texas at Austin) *Jun 2023 –*
- Raymond Guo (Undergraduate, The University of Texas at Austin) *Jan 2023 – Jun 2023*
- Jonathan Palmer (Ph.D. Student, Northwestern University) *Sep 2021 – Jun 2022*
- Connor Terry-Weatherly (Ph.D. Student, Northwestern University) *Jan 2021 – Jun 2021*

LEADERSHIP EXPERIENCEs

- **MRSEC Outreach**, Austin *Feb 2024 –*
  Volunteering for science fair from Texas School for the Blind and Visually Impaired
- **STEM Muse,** Austin *Sep 2023 –*
  Mentoring women undergraduate student in STEM field for their career development
- **MITE Program,** The University of Texas at Austin *Jul 2023* and *Jul 2024*
  Assistant for hands-on lab session. Making nanomaterials for class-demo
- **Quantum Information Science Subgroup Leader,** Northwestern University *Jun 2021 – Jun 2022*
  Leading subgroup meetings in the absence of my advisor due to the sabbatical
- **Materials Science Umbrella Society,** Northwestern University *Dec 2019 – Jun 2022*
  President of the Materials Research Society at Northwestern University
- **Korean Student Association,** Northwestern University *Sep 2020 – Sep 2021*
  President for raised $2K to fund networking events and seminars for over 200 Korean graduate students.

TEACHING

Teaching Assistant

- *Physics of Materials (Mat_Sci 351), Northwestern University* *Jan 2021 – Mar 2021*
  Supported online-based lab sessions with portable oscilloscopes.
- *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.