Juyoung Oh

Postdoctoral Scholar

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Education

Ph.D.	Seoul National University, Seoul, South Korea Aerospace Engineering Title: Metal-based Energetic Materials: Experimental Investigation of the Effects of Aging and the Changes in Thermochemical Properties on Chemical Reaction Kinetics **(Best Doctoral Thesis Award 2022)** Thesis Advisor: Professor Jack J. Yoh	Feb. 2023
M.S.	Seoul National University, Seoul, South Korea Mechanical and Aerospace Engineering Title: Thesis Advisor: Professor Jack J. Yoh	Feb. 2019
B.S.	Konkuk University, Seoul, South Korea Mechanical and Aerospace Engineering Advisor: Professor Chang-Joo Kim	Feb. 2017

Research Interests

- Battery safety mechanisms
- Thermal runaway prevention in high-energy systems
- Advanced energy materials for storage, conversion, and controlled release
- Multifunctional and switchable materials integrating electrochemical and energetic functions
- Interfacial chemistry in batteries, fuel cells, and energetic systems
- Mechanistic understanding of aging in solid energetic materials for aerospace applications
- Sustainable and scalable approaches for next-generation energy devices

Experience

Postdoctoral Scholar

Mechanical Engineering Department,
Stanford University · Full-time
452 Escondido Mall, Stanford, CA 94305
Advisor: Dr. Hai Wang

Jan. 2026 – Present

Research Keywords: Battery-Propellant Hybrid Systems; Thermal Runaway; Alkali Metal Anode; Solid-Liquid Interfacial Behavior; Thermodynamics; Thermal Analysis

Project: Battery-Propellant Hybrid Systems

Contributions: Identified sodium solid–liquid interfacial behavior and investigated hybrid monopropellant battery systems to elucidate their underlying reaction mechanisms.

Techniques: Differential scanning calorimetry (DSC), Thermogravimetry analysis (TGA), Synchrotron X-ray diffraction (XRD), Scanning electron microscope (SEM), X-ray photoelectron spectroscopy (XPS), Fourier-transform infrared spectroscopy (FTIR)

Postdoctoral Associate — Jan. 2024 – Jan. 2026

Materials Science & Nanoengineering Department,
Rice University · Full-time
6100 Main St., Houston, TX 77005
Advisor: Dr. Ming Tang

Research Keywords: Battery-Propellant Hybrid Systems; Thermal Runaway; Alkali Metal Anode; Solid-Liquid Interfacial Behavior; Thermodynamics; Thermal Analysis

Project: Battery-Propellant Hybrid Systems

Contributions: Identified chemical reaction pathways and interfacial chemistry of Li-electrolyte and Li-cathode electrode reactions to understand thermal runaway mechanisms of lithium metal battery systems.

Techniques: DSC, TGA, Synchrotron XRD, SEM, XPS, Field X-ray Imaging (FXI)

Postdoctoral Associate — Mar. 2023 – Jul. 2023

Institute of Advanced Machines and Design,
Seoul National University · Full-time
Seoul, South Korea
Advisor: Dr. Jack J. Yoh

Research Keywords: Combustion of Metal Particles; Explosives; Pyrotechnics; Chemical Reaction Kinetics; Energetic Materials; Aging Analysis; Ultrahigh-Nickel Lithium-ion Batteries; Battery Thermal Runway

Project: Unit component-specific heat generation modeling based on DSC analysis
Contributions: Established the thermal runaway mechanisms of ultrahigh-nickel lithium-ion batteries through thermal analysis.

Project: MTV Aging Lifespan Prediction and Optimization
Contributions: Characterized hygrothermal aging of MTV igniters and established predictive models of reactivity under varying humidity and aging conditions.

Project: Generation of Carbon-Free Renewable Energy via Diagnosis of Metal Fuels and Deep Learning Based Lifetime Prediction
Contributions: Investigated magnesium metal particles as renewable energy carriers by quantifying their thermal reactivity and sensitivity to atmospheric conditions.

Techniques: DSC&TGA, XRD, SEM, XPS

Teaching and Mentoring Experience

Mentoring Experience

Manager Assistant — 2024-2025
Instrument: Mettler Toledo DSC 5+
Shared Equipment Authority (SEA) at Rice University

- Provided training service on the instrument for users
- Taught analytical science and reliable technical methods
- Provided consultation and technical guidance
- Maintained and troubleshot laboratory equipment

A mentor — X 2025
Program: Dr Ming Tang Summer Lab
Department of Materials Sciences and NanoEngineering, Rice University

- Led a summer lab, “Hands-On Laboratory in Battery Fabrication and Testing”
- Guided a mentee through weekly meetings on the experiment status, offering critical feedback
- Led experiment sessions on how to make battery coin cells & do battery tests
- Guided mentees through lab tours and supervised equipment use to enhance their practical laboratory experience

A mentor — X 2025

Program: The Summer Undergraduate Research Fellowship (SURF)
Office of Undergraduate Research and Inquiry, Rice University

- Led a summer session, “How to Design an Experiment in Engineering“
- Guided a mentee through weekly meetings on the research project, offering critical feedback
- Led experiment sessions on how to make battery coin cells & do battery tests
- Led an experiment session on how to perform DSC tests using battery electrodes
- Guided mentees through lab tours and supervised equipment use to enhance their practical laboratory experience

Teaching Experience

General Assistant S 2022
Course: Aerospace Engineering Experiment I
Department of Aerospace Engineering, Seoul National University

- Compiled and managed grade records from multiple teaching assistants
- Prepared laboratory materials and equipment for weekly experiments
- Graded assignments and tests for 60 undergraduate students
- Led a weekly experiment session for a subset of 20 students
- Interacted with students during weekly office hours

Teaching assistant S 2021
Course: Aerospace Engineering Experiment I
Department of Aerospace Engineering, Seoul National University

- Graded assignments and tests for 60 undergraduate students
- Led a weekly experiment session for a subset of 20 students
- Interacted with students during weekly office hours

Teaching assistant S 2020
Course: Aerospace Engineering Experiment I
Department of Aerospace Engineering, Seoul National University

- Graded assignments and tests for 60 undergraduate students
- Led a weekly experiment session for a subset of 20 students
- Interacted with students during weekly office hours

Teaching assistant S 2019
Course: Engineering Research Ethics and Writing Skills
Department of Mechanical and Aerospace Engineering, Seoul National University

- Graded assignments and tests for 100 graduate students
- Interacted with students during weekly office hours

Teaching assistant S 2018
Course: Aerospace Engineering Experiment I
Department of Mechanical and Aerospace Engineering, Seoul National University

- Graded assignments and tests for 60 undergraduate students
- Led a weekly experiment session for a subset of 20 students
- Interacted with students during weekly office hours

Fellowships, Awards, and Honors

Korean-American Women in Science and Engineering (KWiSE) Young Scientist Scholarship 2025

Outstanding Doctoral Dissertation Award, 2023 Korean Society of Propulsion Engineers Fall Conference 2023

Best Doctoral Thesis Award, Seoul National University	2023
Aerospace Excellence Research Award Winners of Brain Korea, Seoul National University	2022
Best Paper Award Winners, 2021 Korean Society of Combustion Fall Conference	2021
Outstanding Doctoral Dissertation Award, 2021 Korean Society of Combustion Fall Conference	2021
Aerospace Excellence Research Award Winners of Brain Korea 2021, Seoul National University	2021
Best Presentation Paper Award, The Korean Society of Propulsion Engineers Fall Conference	2020
Superior Presentation Winners, The Korean Society for Aeronautical & Space Sciences Fall Conference	2020
Top 100 National Research and Development Excellence in 2020, Ministry of Science and ICT, South Korea	2020
Scholarship from Transformative Training Program for Creative Core Engineers in Space Engineering, Seoul National University	2017 – 2018
Honors Scholarship, Konkuk University	2014 – 2015

Professional Service

Committee Member

A member of the Women in Combustion Advisory Committee (WiCAC) for Combustion Institute — 2024 – 2026

Board Member

A Young Editorial Board Member (YEBM) for the journal FirePhysChem — 2025 – 2027

Manuscript Reviewer

Combustion and Flame
The Korean Society for Aeronautical and Space Sciences
Advanced Powder Technology
Combustion Science and Technology
FirePhysChem

Professional Association

Member of the Materials Research Society (MRS)	2025 – present
Member of Korean-American Scientists and Engineers Association (KSEA)	2025 – present
Member of Korean-American Women in Science & Engineering (KWiSE)	2023 – present

Publications

International Peer-Reviewed Journals

17. Rajendra Rajak, Daehong Lim, **Juyoung Oh**, Kanagaraj Gnanaprakash, and Jack J. Yoh “External voltage driven linear burning rates for improving propulsion efficiency and control in space applications” *Aerospace Science and Technology*, Vol. 164, pp. 110413, (2025). (IF: 5.0, JCR Ranking: 10.6%) [PDF]

16. Ayushi Mehrotra, Pragya Berwal Singh, **Juyoung Oh**, Yejun Lee, and Jack J. Yoh “From micro-explosion to full-scale fire: predicting thermal runaway in ultra-high nickel lithium-ion batteries with layering effect” Energy, Vol. 320, pp. 135502, (2025). (IF: 9.0, JCR Ranking: 3.2%) [PDF]

15. **Juyoung Oh**, Seung-gyo Jang, and Jack J. Yoh “On the pyrolysis mechanism of Magnesium-Teflon-

Viton (MTV) igniters subjected to seasonal aging" *Fuel*, Vol.389, pp.134604, (2025). (IF: 6.700, JCR Ranking: 13.2%) [PDF]

14. Yejun Lee, **Juyoung Oh,** and Jack J. Yoh "Effect of hygrothermal aging on the pyrolysis of magnesium and its mixture" *Fuel*, Vol. 387, pp. 134424, (2025). (IF: 6.700, JCR Ranking: 13.2%) [PDF]

13. **Juyoung Oh** and Jack J. Yoh "Exploration of altered reaction pathways in aging pyrotechnic compositions under seasonal cycles" *Combustion and Flame*, Vol. 269, pp.163771, (2024). (IF: 5.800, JCR Ranking: 6.90%) [PDF]

12. **Juyoung Oh**, Ayushi Mehrotra, Yejun Lee, Bohoon Kim, and Jack J. Yoh "Thermal runaway aspect of ultrahigh-nickel cathode based lithium-ion batteries at increasing charge states" *Journal of Energy Storages*, Vol. 76, pp.109887, (2024). (IF: 8.000, JCR Ranking: 16.80%) [PDF]

11. Yejun Lee, **Juyoung Oh,** and Jack J. Yoh "Aging effects on Magnesium–Teflon–Viton related to magnesium hydroxide formation and the weakened bond of polytetrafluoroethylene" *Journal of Thermal Analysis and Calorimetry*, Vol.149, pp.2189-2197, (2024). (IF: 3.000, JCR Ranking: 28.30%) [PDF]

10. Upasana Priyadarshani Padhi, **Juyoung Oh**, Ayushi Mehrotra, Yejun Lee, and Jack J. Yoh "A predictive theory on thermal runaway of ultrahigh capacity lithium-ion batteries" *Combustion and Flame,* Vol. 258, pp.113116, (2023). (IF: 5.800, JCR Ranking: 6.90%) [PDF]

9. **Juyoung Oh** and Jack J. Yoh "Understanding how metal oxidation and oxidizer decomposition affect the thermal degradation of aging pyrotechnic compositions" *Combustion and Flame*, Vol. 257, pp.113038, (2023). (IF: 5.800, JCR Ranking: 6.90%) [PDF]

8. Jun-ho Yang, Yejun Lee, **Juyoung Oh**, Bohoon Kim, and Jack J. Yoh "A Real-Time Monitoring of Pre-overcharging in High-Nickel Lithium Ion Batteries Via Plasma Emission Spectroscopy" *Journal of Energy Storages,* Vol. 72, pp. 108634, (2023). (IF: 8.90, JCR Ranking: 16.80%) [PDF]

7. **Juyoung Oh**, Yejun Lee, and Jack J. Yoh "On the oxidation kinetics of aging magnesium particles" *Combustion and Flame*, Vol. 249, pp.112597, (2023). (IF: 5.800, JCR Ranking: 6.90%) [PDF]

6. Yejun Lee, **Juyoung Oh**, and Jack J. Yoh "Understanding the reactivity of magnesium powder subjected to various aging conditions." *Journal of Environmental Chemical Engineering*, Vol. 10, No. 5, pp. 108535, (2022). (IF: 7.400, JCR Ranking: 10.30%) [PDF]

5. **Juyoung Oh**, Haewoong Jung, and Jack J. Yoh "Observation of gunpowder-like thermochemical responses of a thermal energy storage system based on KNO_3/$NaNO_3$/Graphite exposed to a heat transfer fluid." *Applied Thermal Engineering*, Vol. 207, pp. 118215, (2022). (IF: 6.100, JCR Ranking: 4.70%) [PDF]

4. **Juyoung Oh** and Jack J. Yoh "Insights into aging mechanism of Ti-metal based pyrotechnics and changes in thermo-kinetic characteristics." *Proceedings of the Combustion Institute*, Vol. 38, No. 3, pp. 4441-4449, (2021). (IF: 5.300, JCR Ranking: 9.20%) [PDF]

3. **Juyoung Oh** and Jack J. Yoh "Critical changes in the ignition and combustion characteristics of aged titanium based initiators." *Combustion and Flame*, Vol. 221, pp. 74-85, (2020). (IF: 5.800, JCR Ranking: 6.90%) [PDF]

2. **Juyoung Oh**, Seung-gyo Jang, and Jack J. Yoh "Towards understanding the effects of heat and humidity on ageing of a NASA standard pyrotechnic igniter." *Scientific Reports*, Vol. 9, No. 1, pp. 1-12, (2019). (IF: 3.800, JCR Ranking: 18.30%) [PDF]

1. **Juyoung Oh**, Anirudha Ambekar, and Jack J. Yoh "The hygrothermal aging effects of titanium hydride potassium perchlorate for pyrotechnic combustion." *Thermochimica Acta*, Vol. 665, pp. 102-110, (2018). (IF: 3.100, JCR Ranking: 25.70%) [PDF]

Peer-Reviewed Journals (Korea)

6. **Juyoung Oh**, and Jai-ick Yoh. "Key factors that can affect the chemical reaction kinetics of aged metals/$KClO_4$-based energetic materials." *Journal of the Korean Society of Propulsion Engineers*, Vol. 26,

No. 4, pp. 28-43, (2022).

5. **Juyoung Oh** and Jai-ick Yoh. “Investigation of Thermal/hygrothermal Aging Effects on the Ignition Characteristics of Ti Metal-based Pyrotechnics and Construction of the Aging Models.” *Journal of the Korean Society of Propulsion Engineers*, Vol. 25, No. 3, pp. 26-41, (2021).

4. **Juyoung Oh** and Jai-ick Yoh. “Establishment of hygrothermal aging mechanism via thermal analysis and extraction of reaction kinetics of Ti metal-based pyrotechnic material.” *Journal of the Korean Society for Aeronautical and Space Sciences*, Vol. 49, No. 9, pp. 759-769, (2021).

3. **Juyoung Oh** and Jai-ick Yoh. “Critical effects of temperature and relative humidity on thermal performance on aging of NASA standard pyrotechnic initiator ‘ZPP’.” *Journal of the Korean Society of Combustion*, Vol. 26, No. 2, pp. 23-39, (2021).

2. Byungheon Han, Jihoon Ryu, Junho Yang, **Juyoung Oh**, K. Gnanaprakash, and Jai-ick Yoh. “Aging of Solid Fuels Composed of Zr and ZrNi Part 1: Thermal/Chemical/Spectroscopic Analysis” *Journal of the Korean Society of Propulsion Engineers*, Vol. 24, No. 2, pp.1-13, (2020).

1. **Juyoung Oh** and Jai-ick Yoh. “The analysis on the effects of hygrothermal aging to THPP using DSC and XPS.” *Journal of the Korean Society of Propulsion Engineers*, Vol. 23, No. 1, pp. 79-92, (2019).

Abstracts

Oral Presentations

19. **Juyoung Oh** and Ming Tang “Bridging Experiment and Simulation: Advancing Thermal Runaway Understanding in Lithium Metal Batteries” 2025 International Conference on Numerical Combustion (**ICNC**), Oct. 14-17, 2025, Rome, Italy.

18. **Juyoung Oh** and Ming Tang “Understanding the Thermochemical Reactions of Lithium and Carbonate Electrolytes at Elevated Temperatures” 30th International Colloquium on the Dynamic of Explosions and Reactive systems (**ICDERS**), July 27-August 1, 2025, Ottawa, Canada.

17. **Juyoung Oh** and Ming Tang “A Deep Look into the Thermochemical Reactions Between Lithium and Carbonate Electrolytes at Elevated Temperature” 2025 MRS Spring Meeting & Exhibit, April 07-11, 2025, Seattle, WA, USA.

16. Yejun Lee, **Juyoung Oh**, and Jack J. Yoh “Reaction kinetics of magnesium subjected to hygrothermal aging at oxygen-rich conditions.” 29th International Colloquium on the Dynamic of Explosions and Reactive systems (**ICDERS**), July 23-28, 2023, SNU Siheung, South Korea.

15. Rajendra Rajak, Daehong Lim, Gnanaprakash Kanagaraj, **Juyoung Oh**, and Jack J. Yoh “Thermal Analysis of Electrically Controlled Solid Propellant with Different Metal Additives.” 29th International Colloquium on the Dynamic of Explosions and Reactive systems (**ICDERS**), July 23-28, 2023, SNU Siheung, South Korea.

14. Rajendra Rajak, Daehong Lim, Gnanaprakash Kanagaraj, **Juyoung Oh**, and Jack J. Yoh “Peculiar Burning Characteristics of Electrically Controlled Solid Propellants.” 29th International Colloquium on the Dynamic of Explosions and Reactive systems (**ICDERS**), July 23-28, 2023, SNU Siheung, South Korea.

13. **Juyoung Oh**, Ayushi Mehrotra, Yejun Lee, and Jack J. Yoh “The Significant Hazards of Thermal Runaway of Ultra-high-nickel Lithium-ion Batteries during Charging.” 29th International Colloquium on the Dynamic of Explosions and Reactive systems (**ICDERS**), July 23-28, 2023, SNU Siheung, South Korea.

12. Yejun Lee, **Juyoung Oh,** and Jack J. Yoh “Peculiar characteristics of magnesium subjected to hygrothermal aging.” 14th Asia Pacific Conference on Combustion (**ASPACC**), May 14-18, 2023, Kaogsiung, Taiwan.

11. **Juyoung Oh**, Yejun Lee, and Jack J. Yoh “Hygrothermal aging of magnesium particles on the performance of metal-fluorocarbon pyrolants.” 14th Asia Pacific Conference on Combustion (**ASPACC**),

May 14-18, 2023, Kaogsiung, Taiwan.

10. **Juyoung Oh**, Yejun Lee, Seung-gyo Jang, and Jack J. Yoh "Understanding the combustion process for MTV igniter under nitrogen atmosphere and hygrothermal aging effects on its combustion process." 11th Asian Joint Conference on Propulsion and Power (**AJCPP**), March 15-18, 2023, Kanazawashi Cultural Hall, Ishikawa, Japan.

9. **Juyoung Oh** and Jack J. Yoh "Changes in the thermodynamic/statistical characteristics of Mg metal fuel by aging and O_2 flow rate." 28th International Colloquium on the Dynamic of Explosions and Reactive systems (**ICDERS**), June 19-24, 2022, University of Naples Federico II – Engineering Campus, Italy.

8. **Juyoung Oh** and Jack J. Yoh "Thermal Runaway in the Thermal Energy Storage System." 13th Asia Pacific Conference on Combustion (**ASPACC**), December 5-9, 2021, Abu Dhabi National Exhibition Centre (ADNEC), United Arab Emirates.

7. **Juyoung Oh** and Jack J. Yoh "Prediction of lifetime and stability for titanium-based pyrotechnics based on chemical kinetic mechanisms of combustion." 10th Asian Joint Conference on Propulsion and Power (**AJCPP**), March 3-6, 2021, Jeju ICC, South Korea.

6. **Juyoung Oh** and Jack J. Yoh "Insights into aging mechanism of Ti-metal based pyrotechnics and changes in thermo-kinetic characteristics." **38th International Symposium on Combustion**, January 24-29, 2021, Adelaide, Australia.

5. **Juyoung Oh** and Jack J. Yoh "On a new correlation between reaction mechanism and ignition delay time for the NASA standard initiator exposed to various aging conditions" American Institute of Aeronautics and Astronautics (**AIAA**), August 24-26, 2020, Hyatt Regency New Orleans, New Orleans, USA.

4. **Juyoung Oh**, Yoonsik Park, and Jack J. Yoh "The changes of thermodynamic reactions of a NASA standard initiator due to hygrothermal aging." 27th International Colloquium on the Dynamic of Explosions and Reactive systems (**ICDERS**), July 28- August 02, 2019, Peking University, Beijing, China.

3. **Juyoung Oh**, Yoonsik Park, and Jack J. Yoh "Investigation of temperature and humidity effects on the reaction performance of a NASA standard initiator" 12th Asia Pacific Conference on Combustion (**ASPACC**), July 01-05, 2019, Fukuoka International Congress Center, Fukuoka, Japan.

2. **Juyoung Oh** and Jack J. Yoh "Understanding the hygrothermal aging effects and lifetime prediction on a NASA standard initiator" **21st Biennial Conference on Shock Compression of Condensed Matter**, June 16-21, 2019, Hilton Portland Downtown, Portland, USA.

1. **Juyoung Oh**, Anirudha Ambekar, Yoocheon Kim, and Jack J. Yoh "Effects of humidity on the aging of the pyrotechnic combustions ZPP and THPP." 11th Asia Pacific Conference on Combustion (**ASPACC**), December 10-14, 2017, The University of Sydney, Australia.

International Workshop

The Asian Dean's Forum-The Rising Stars Women in Engineering Workshop, 2023 Institutional Participants (**Juyoung Oh**), Nov. 20-22, 2023, The University of Tokyo, Japan. https://risingstarsasia.org/2023/participants_detail.php?id=143)

Seminar

Juyoung Oh "A Deep Dive into the Thermochemical Reactions of Lithium Metal Batteries at Elevated Temperatures for Propulsion Systems" BK21 FOUR Special Seminar Series, February 26, 2025, Rm. 1319, Bldg. 301, Seoul National University, Seoul, South Korea. [Link]