

# Dr. Ji Hoon Lee

Postdoctoral Researcher

E-mail: [lee.jihoon@columbia.edu](mailto:lee.jihoon@columbia.edu), [jihoonlee@bnl.gov](mailto:jihoonlee@bnl.gov), and [myandante1@gmail.com](mailto:myandante1@gmail.com)

Personal Webpage: <https://sites.google.com/site/jihoonleesite/home>

Google Scholar: <http://scholar.google.co.kr/citations?user=yF4LBAkAAAAJ&hl=ko>

ORCID: <https://orcid.org/0000-0002-6459-7120>

Birth: 1987, Republic of Korea

## Work Experience

---

- Postdoctoral Researcher, Department of Chemical Engineering, Columbia University, USA (Aug 2017~)  
Advisor: Prof. Jingguang Chen [[Link](#)]
- Postdoctoral Researcher, Applied Science Institute, KAIST, Republic of Korea (Mar 2017~ Jul 2017)  
Advisor: Prof. Jang Wook Choi [[Link](#)]

## Education

---

- **Ph. D.**, KAIST, Republic of Korea (Feb 2017), GPA: 4.26/4.30  
*Thesis*: Development and Analysis of Novel Functional Materials for Energy Storage and Gas Separation  
Advisor: Prof. Jang Wook Choi [[Link](#)]
- **M.S.**, KAIST, Republic of Korea (Feb 2013)  
*Thesis*: A Study on High Performance Lithium Ion Capacitors with Functionalized Graphene  
Advisor: Prof. Jang Wook Choi [[Link](#)]
- **B.S.**, University of Seoul, Republic of Korea (Sep 2011)  
GPA: 4.20/4.50, Summa Cum Laude, Early Graduation in 7 Semesters (*Ranked 1<sup>st</sup> in class of 2011*)

## Awards and Honors

---

- The International Postdoctoral Fellowship, The Korean National Research Foundation (Mar 2017)
- The Best Doctoral Thesis Award, KAIST (Feb 2017)
- The Best XAFS Study Award, Korea Synchrotron Radiation User's Association (KOSUA) (Sep 2016)
- The Best Presentation Award, The Korean Society of Industrial and Engineering Chemistry (KSIEC) (May 2016)
- The Best Paper Award, KAIST Institute for the NanoCentury (KINC) (Oct 2015)
- The Best Poster Award, Korean Chemical Society (KCS) (Oct 2015)
- Early Graduation & Summa Cum Laude, Univ. of Seoul (Aug 2011)
- Full Scholarship in B.S. Degree, Korea Student Aid Foundation (KOSAF) (2009-2011)

## Publications (# of citation as of Mar 2018)

---

1. **J. H. Lee**, H. J. Lee, S. H. Choi, J. Shin, S.-Y. Chung, and J. W. Choi\*, "Superlattice Formation of Crystal Water in Layered Double Hydroxides for Long-term and Fast Operation of Aqueous Rechargeable Batteries", *Adv. Energy Mater.*, 2018, Online Published, [[Link](#)] (# of Citation: 0)
2. **J. H. Lee**<sup>†</sup>, H. J. Lee<sup>†</sup>, J. W. Choi\*, "Unveiling Anomalous CO<sub>2</sub>-to-N<sub>2</sub> Selectivity of Graphene Oxide", *Physical Chemistry Chemical Physics*, 2017, 19, 22743-22748 (†: *equal contribution*) [[Link](#)] (# of Citation: 1), *Selected as "2017 PCCP HOT Articles"*

3. S. Y. Lim, **J. H. Lee**, S. Kim, J. Shin, W. Choi, K. Y. Chung, D. S. Jung, J. W. Choi\*, “Lattice Water for the Enhanced Performance of Amorphous Iron Phosphate in Sodium-ion Batteries”, *ACS Energy Lett.*, 2017, 2, 998-1004 [[Link](#)] (# of Citation: 5)
4. **J. H. Lee**, H. J. Lee, S. Y. Lim, K. H. Chae, S. H. Park, K. Y. Chung, E. Deniz\*, J. W. Choi\*, “Stabilized Octahedral Frameworks in Layered Double Hydroxides by Solid-Solution Mixing of Transition Metals”, *Adv. Funct. Mater.*, 2017, 27, 1605225 [[Link](#)] (# of Citation: 10)
5. S. N. Talapaneni, **J. H. Lee**, S. H. Je, O. Buyukcakir, T.-w. Kwon, K. Polychronopoulou, J. W. Choi\*, Ali Coskun\*, “Chemical Blowing Approach for Ultramicroporous Carbon Nitride Frameworks and Their Applications in Gas and Energy Storage”, *Adv. Funct. Mater.*, 2017, 27, 1604658 [[Link](#)] (# of Citation: 10)
6. T. Yim, N. H. Park, M.-S. Park, S. H. Han, **J. H. Lee**, J. Shin, J. W. Choi\*, Y. Jung, Y. N. Jo, J.-S. Yu, K. J. Kim\*, “Effective Polysulfide Rejection by Dipole-aligned BaTiO<sub>3</sub> Coated Separator in Lithium–Sulfur Batteries”, *Adv. Funct. Mater.*, 2016, 26, 7817-7823 [[Link](#)] (# of Citation: 23)
7. **J. H. Lee**, K. Kwac, H. J. Lee, S. Y. Lim, D. S. Jung, Y. Jung\*, J. W. Choi\*, “Optimal Activation of Porous Carbon for High Performance CO<sub>2</sub> Capture”, *ChemNanoMat*, 2016, 2, 528-533 [[Link](#)] (# of Citation: 3)
8. K. Kwac, **J. H. Lee**, J. W. Choi\*, Y. Jung\*, “Computational Analysis of Pressure-Dependent Optimal Pore size for CO<sub>2</sub> Capture with Graphitic Surfaces”, *J. Phys. Chem. C*, 2016, 120, 3978-3985 [[Link](#)] (# of Citation: 4)
9. T. J. Trivedi, **J. H. Lee**, H. J. Lee, Y. K. Jeong, J. W. Choi\*, “Deep Eutectic Solvents as Attractive Media for CO<sub>2</sub> Capture”, *Green Chem.*, 2016, 18, 2834-2842 [[Link](#)] (# of Citation: 28)
10. H. J. Lee<sup>†</sup>, **J. H. Lee**<sup>†</sup>, S.-Y. Chung\*, J. W. Choi\*, “Enhanced Pseudocapacitance in Multicomponent Transition Metal Oxides by Local Distortion of Oxygen Octahedra”, *Angew. Chem. Int. Ed.*, 2016, 55, 3958-3962 (†: *equal contribution*) [[Link](#)] (# of Citation: 7), [Selected as “the best XAFS study”](#) in KOSUA (2016)
11. **J. H. Lee**, H. J. Lee, S. Y. Lim, B. G. Kim, J. W. Choi\*, “Combined CO<sub>2</sub>-philicity and Ordered Meso-porosity for Highly Selective CO<sub>2</sub> Capture at High Temperatures”, *J. Am. Chem. Soc.*, 2015, 137, 7210-7216 [[Link](#)] (# of Citation: 37), [Highlighted in ACS Virtual Issue](#)
12. D. S. Jung, T. H. Hwang, **J. H. Lee**, H. Y. Koo, R. A. Shakoob, R. Kahraman, Y. N. Jo, M.-S. Park, J. W. Choi\*, “Hierarchical Porous Carbon by Ultrasonic Spray Pyrolysis Yields Stable Cycling in Lithium-Sulfur Battery”, *Nano Lett.*, 2014, 14, 4418-4425 [[Link](#)] (# of Citation: 130)
13. **J. H. Lee**, W. H. Shin, S. Y. Lim, B. G. Kim, J. W. Choi\*, “Modified Graphite and Graphene Electrodes for High Performance Lithium Ion Hybrid Capacitors”, *Mater. Renew. Sustain. Energy*, 2014, 3, 1-8 [[Link](#)] (# of Citation: 20)
14. S. Y. Lim<sup>†</sup>, H. Kim<sup>†</sup>, J. Chung, **J. H. Lee**, B. G. Kim, J.-J. Choi, K. Y. Chung, W. Cho, S.-J. Kim, W. A. Goddard III\*, Y. Jung\*, J. W. Choi\*, “Role of Intermediate Phase for Stable Cycling of Na<sub>7</sub>V<sub>4</sub>(P<sub>2</sub>O<sub>7</sub>)<sub>4</sub>PO<sub>4</sub> in Sodium Ion Battery”, *Proc. Natl. Acad. Sci. USA*, 2014, 111, 599-604 (†:equal contribution) [[Link](#)] (# of Citation: 62)
15. **J. H. Lee**, N. Park, B. G. Kim, D. S. Jung, K. Im, J. Hur\*, J. W. Choi\*, “Restacking-Inhibited 3D Reduced Graphene Oxide for High Performance Supercapacitor Electrodes”, *ACS Nano*, 2013, 7, 9366-9374 [[Link](#)] (# of Citation: 207)
16. **J. H. Lee**, W. H. Shin, M. H. Ryou, J. K. Jin, J. Kim, J. W. Choi\*, “Functionalized Graphene for High Performance Lithium Ion Capacitor”, *ChemSusChem*, 2012, 5, 2328-2333 [[Link](#)] (# of Citation: 60), [Featured in Chemistry Views](#)

## Presentations

---

1. **J. H. Lee**\* (Invited Talk), “Development and Analysis for High Performance Electrochemical Capacitor Electrodes by Using X-ray Absorption Fine Structure (XAFS) Analyses”, KBSI (Korea Basic Science Institute), Daejeon, Republic of Korea, Aug 7, 2017
2. **J. H. Lee**, J. W. Choi\* (Poster Presentation), “Combined CO<sub>2</sub>-philicity and Ordered Meso-porosity for Highly Selective CO<sub>2</sub> Capture at High Temperatures”, NanoKorea 2017, Goyang, Republic of Korea, JUL 10, 2017
3. **J. H. Lee**\* (Seminar), “Development and Analysis of Materials for Energy and Environmental Applications”, *The Best Doctoral Thesis Award*, KAIST, Daejeon, Republic of Korea, May 17, 2017
4. **J. H. Lee**, J. W. Choi\* (Oral Presentation), “Stabilized Octahedral Frameworks in Layered Double Hydroxides by Solid-solid Mixing of Transition Metals”. The Korean Chemical Society Spring Meeting (119<sup>th</sup>), Goyang, Republic of Korea, APR 20, 2017
5. **J. H. Lee**, J. W. Choi\* (Oral Presentation), “Combined CO<sub>2</sub>-philicity and Ordered Meso-porosity for Highly Selective CO<sub>2</sub> Capture at High Temperatures”, *Selected as “The Best Oral Presentation Award”*, The Korean Society of Industrial & Engineering Chemistry (KSIEC) Spring Meeting, Yeosu, Republic of Korea, May 4, 2016
6. **J. H. Lee**, J. W. Choi\* (Oral Presentation), “Optimal Intermediate Activation of Porous Carbon for High Performance CO<sub>2</sub> Capture”, The Korean Chemical Society Spring Meeting (117<sup>th</sup>), Goyang, Republic of Korea, APR 21, 2016
7. **J. H. Lee**, J. W. Choi\* (Oral Presentation), “Combined CO<sub>2</sub>-philicity and Ordered Meso-porosity for Highly Selective CO<sub>2</sub> Capture at High Temperatures”, *Selected as “The Best Paper Award”*, KAIST Institute for the NanoCentury (KINC) Workshop, Hwaseong, Republic of Korea, OCT 29, 2015
8. **J. H. Lee**, J. W. Choi\* (Poster Presentation), “Combined CO<sub>2</sub>-philicity and Ordered Meso-porosity for Highly Selective CO<sub>2</sub> Capture at High Temperatures”, *Selected as “The Best Poster Award (SejinCI Poster Award)”*, The Korean Chemical Society Fall Meeting (116<sup>th</sup>), Daegu, Republic of Korea, OCT 10, 2015
9. **J. H. Lee**, J. W. Choi\* (Oral Presentation), “Restacking-inhibited 3D Reduced Graphene Oxide for High Performance Supercapacitor Electrodes”, Material Research Society (MRS) Spring Meeting in San Francisco, USA, APR 25, 2014
10. **J. H. Lee**, J. W. Choi\* (Oral Presentation), “Restacking-inhibited 3D Reduced Graphene Oxide for High Performance Supercapacitor Electrodes”, The Korean Electrochemical Society Fall Meeting, Daejeon, Republic of Korea, NOV 7, 2013

## Projects

---

I handled the listed grant projects covering proposals, experiments, and reports.

	Project Name	Agent	Period
1	Next Generation Lithium Ion Capacitors with High Energy/Power Densities and Long Cycle Life	SK Innovation	DEC `2011-NOV `2012
2	Bio-adaptable Hydrogel Based Energy Storage Devices	Samsung Advanced Institute of Technology	May `2013-DEC `2014

3	Functionalized Porous Graphene Networks for High Performance CO <sub>2</sub> Capture, Separation & Conversion	Saudi Aramco	JAN `2014- DEC `2014
4	Nanomaterials for Ultra-high Performance Supercapacitors	Climate Change Research Hub (KAIST)	APR `2014- DEC `2014
5	High Performance Aqueous Rechargeable Batteries based on Hydrated Intercalation	Samsung Electronics	DEC `2016-

## Patents

---

1. Graphene Based Electrode Material for Supercapacitor Electrode with High Performance and Supercapacitor Including Same; Applied; SEP 13, 2013 (10-2013-0110233), ***Registered: JAN 1, 2015 (10-1486658).***
2. Negative Electrode Active Material of Lithium Ion Capacitor, Manufacturing Method Thereof, and Lithium Ion Capacitor Including Same; Applied; FEB 7, 2013 (10-2013-0013960)
3. Anode Active Material Lithium Ion Capacitor and Method for Manufacturing Same; Applied; OCT 30, 2012 (10-2012-0121604)

## Technical Skills

---

### 1. Characterization

- TEM, SEM, XPS, FT-IR, TGA/DSC, EA, Raman, UV-Vis, XRD
- Battery Testing (VMP3, WonATEC, Princeton), Gas Sorption Analysis (3FLEX)

### 2. Material Design and Synthesis

- CVD Synthesis, Hummers' Method, Co-precipitation, Hydrothermal Synthesis
- XRD Structural Refinement (Fullprof, GSAS-II)

### 3. Synchrotron Analysis

- X-ray Absorption Fine Structure (XAFS) Analysis by using *Demeter* package
- *In-situ* X-ray techniques

## Research Interests

---

### 1. Material Synthesis and Characterization

- Novel Carbon Materials (Graphene, CNTs, Activated Carbons, etc.)
- Novel Inorganic Materials (Layered Double Hydroxides)
- Low Dimensional Materials (2D transition metal oxides)
- Mesoscale Ordered Structural Materials (Silica, Polymers, Carbons, etc.)

### 2. Electrochemistry

- Rechargeable Batteries, Electrochemical Capacitors, Electrocatalysts (CO<sub>2</sub> Reduction)

### 3. Gas Storage

- Selective CO<sub>2</sub> Capture and Storage, Chemical CO<sub>2</sub> Fixation

## References

---

### 1. **Prof. Jang Wook Choi** (chief advisor)

Seoul National University, Republic of Korea  
E-mail: [jangwookchoi@snu.ac.kr](mailto:jangwookchoi@snu.ac.kr), Webpage [[Link](#)]

### 2. **Prof. Jingguang Chen**

Columbia University, USA

E-mail: [jgchen@columbia.edu](mailto:jgchen@columbia.edu), Webpage [[Link](#)]

**3. Prof. Sung-Yoon Chung**

Korea Advanced Institute of Science and Technology, Republic of Korea

E-mail: [sychung@kaist.ac.kr](mailto:sychung@kaist.ac.kr), Webpage [[Link](#)]

**4. Prof. Yousung Jung**

Korea Advanced Institute of Science and Technology, KAIST, Republic of Korea

E-mail: [ysjn@kaist.ac.kr](mailto:ysjn@kaist.ac.kr), Webpage [[Link](#)]