

**Dongkyu Lee, Ph.D.**

Assistant Professor of Mechanical Engineering  
University of South Carolina, Columbia, SC

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EDUCATION

- Ph.D., Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, MA (2014)
- M.S., Materials Science and Engineering, Gwangju Institute of Science and Technology, South Korea (2006)
- B.S., summa cum laude, Materials Science and Engineering, Hanyang University, South Korea (2004)

RESEARCH EXPERIENCE

Assistant Professor (January 2018 - )

Mechanical Engineering, University of South Carolina, Columbia, SC

- Developing new oxide nanostructures for advanced solid oxide fuel cells (SOFCs) with epitaxial BaFeO<sub>3</sub> thin films by pulsed laser deposition (PLD)
- Developing higher order Ruddlesden-Popper (RP) thin films for use in solar-thermoelectric devices

Postdoctoral Research Associate (November 2014 - December 2017)

Thin Films and Nanostructures Group, Oak Ridge National Laboratory, Oak Ridge, TN

Advisor: Group Leader, Dr. Ho Nyung Lee

- Developed a completely new hybrid oxide nanostructure consisting of low dimensional system and multilayer system for advanced energy and electronic applications by PLD
- Developed design principles for highly activity cathode materials for intermediate temperature SOFCs with epitaxial A<sub>2</sub>BO<sub>4</sub> thin films deposited by PLD

Postdoctoral Research Associate (June 2014 - November 2014)

Research Laboratory of Electronics (RLE), Massachusetts Institute of Technology, Cambridge, MA

Advisor: Professor Yang Shao-Horn

- Developed advanced heterostructured oxide interface engineering for SOFCs cathode under Solid State Energy Conversion Alliance (SECA) program sponsored by Department of Energy (DOE), USA

Graduate Research Assistant (September 2009 - June 2014)

Electrochemical Energy Laboratory, Massachusetts Institute of Technology, Cambridge, MA

Advisor: Professor Yang Shao-Horn

- Explored the effect of heterostructured oxide interface on the oxygen surface exchange kinetics of ABO<sub>3</sub> perovskite thin films by PLD under SECA program sponsored by National Energy Technology Lab
- Developed strain engineering to control the oxygen electrocatalysis of RP oxide thin films for energy conversion devices using PLD via user proposal to Oak Ridge National Lab

Research Engineer (February 2006 - August 2009)

Process Development Team, Semiconductor R&D Center, Samsung Electronics Co., Ltd., South Korea

- Developed Advanced Gate & Junction Technology for 2x nm Transistor node Dram devices

Graduate Research Assistant (February 2004 - February 2006)

Semiconductor Integrated Device & Process Lab., Gwangju Institute of Science and Technology, South Korea

Advisor: Professor Hyunsang Hwang

- Developed  $\text{BF}_3$  plasma doping and excimer laser annealing to form an p+/n ultra-shallow junction

## PROFESSIONAL ACTIVITIES

- Materials Research Society member and Electrochemical Society member

## HONORS AND AWARDS

- ORNL Director's Award for Collaboration Excellence (2017)
- Graduate School Scholarship Award from Bureau Veritas S. A. (2009 - 2010)
- Best New Employee Award from Samsung Group (2006)
- Brain Korea 21 Graduate School Scholarship, Gwangju Institute of Science and Technology (2004 - 2006)
- Scholarship of Academic Excellence, Hanyang University (all semesters)

## PUBLICATIONS

### *List Selected Peer Reviewed Publications*

1. Q. Lu, S. R. Bishop, **D. Lee**, S. Lee, H. Bluhm, H. L. Tuller, H. N. Lee, and B. Yildiz, "Electrochemically Triggered Metal-Insulator Transition between  $\text{VO}_2$  and  $\text{V}_2\text{O}_5$ ", *Advanced Functional Materials*, 1803024 (2018)
2. T. Meyer\*, R. Jacobs\*, **D. Lee\***, L. Jiang, J. W. Freeland, T. Egami, D. Morgan, and H. N. Lee (\*equal contribution), "Strain Control of Oxygen Kinetics in the Ruddlesden-Popper Oxide  $\text{La}_{1.85}\text{Sr}_{0.15}\text{CuO}_4$ ", *Nature Communication*, 9, 92 (2018)
3. O. Kwon, D. Seol, **D. Lee**, H. Han, I. Lindfors-Vrejoiu, W. Lee, S. Jesse, H. N. Lee, S. V. Kalinin, M. Alexe, and Y. Kim, "Direct Probing of Polarization Charge at Nanoscale Level", *Advanced Materials*, 30, 1703675 (2018)
4. A. Huon, **D. Lee**, A. Herklotz, M. R. Fitzsimmons, H. N. Lee, and S. J. May, "Effect of Chemical Pressure on the Electronic Phase Transition in  $\text{Ca}_{1-x}\text{Sr}_x\text{Mn}_7\text{O}_{12}$  Films", *APL Materials*, 5, 096105 (2017)
5. **D. Lee**, R. Jacobs, Y. Jee, A. Seo, C. Sohn, A. V. Ievlev, O. S. Ovchinnikova, K. Huang, D. Morgan, and H. N. Lee, "Reduced Activation Barrier by Thickness-controlled Strain for Accelerated Oxygen Electrocatalysis in  $\text{La}_{0.6}\text{Sr}_{0.4}\text{CoO}_{3-\delta}$  Thin Films", *The Journal of Physical Chemistry C*, 121, 25651 (2017)
6. **D. Lee** and H. N. Lee, "Controlling oxygen ion migration in Ruddlesden-Popper oxides", *Materials* (joint special issue on electrochemistry of perovskites), **Feature Article**, 10, 368 (2017)
7. **D. Lee**, X. Gao, L. Fan, E. J. Guo, T. O. Farmer, M. R. Fitzsimmons, M. F. Chisholm, and H. N. Lee, "Non-equilibrium synthesis of highly porous single-crystalline oxide nanostructures", *Advance Materials Interfaces*, **Cover Article**, 4, 1601034 (2017)
8. A. Herklotz, **D. Lee**, E. J. Guo, T. Meyer, J. Petrie, H. N. Lee, "Strain Coupling of Oxygen Non-stoichiometry in Perovskite Thin Films", *Journal of Physics: Condensed Matter*, 29, 493001 (2017)
9. L. Fan, X. Gao, **D. Lee**, E. J. Guo, S. Lee, P. Snijders, T. Z. Ward, G. Eres, M. F. Chisholm, and H. N. Lee, "Kinetically Controlled Fabrication of Single-Crystalline  $\text{TiO}_2$  Nanobrush Architectures with High Energy {001} Facets", *Advanced Science*, **Frontispiece**, 1700045 (2017)
10. **D. Lee**, Y. Lee, X. Renshaw Wang, M. D. Biegalski, D. Morgen and Y. Shao-Horn, "Enhancement of Oxygen Surface Exchange on Epitaxial  $\text{La}_{0.6}\text{Sr}_{0.4}\text{Co}_{0.2}\text{Fe}_{0.8}\text{O}_{3-\delta}$  Thin Films using Advanced Heterostructured Oxide Interface Engineering", *MRS Communications*, 6, 204 (2016)