# JAESANG LEE

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Intelligent Display & Sensor Lab.
Dept. of ECE at Seoul National University, Korea

## WORK EXPERIENCE

**Seoul National University** Mar. 2019 - Present
*Assistant professor, Dept. of Electrical & Computer Engineering* *Seoul, Korea*

- Primary research focuses on semiconductor optoelectronic devices for display & sensor applications.
- Research interest includes, but not limited to:
  - Exciton and charge dynamics in organic optoelectronic devices
  - Data-driven analysis of the optoelectronic properties of organic optoelectronic devices
  - Inkjet printing for long-lifetime organic light-emitting diodes (OLEDs) and chemical analysis
  - Optical design of full-color $\mu$-LEDs with directional emission for augmented reality (AR) displays
  - Management of electrical crosstalk in $\mu$-OLEDs for virtual reality (VR) displays
- Teaching: Electromagnetics, Organic semiconductor devices, Display technologies for AR and VR

**Apple Inc.** Mar. 2017 - Jan. 2019
*Display Exploration Engineer* *Cupertino, CA*

- Optimized the optical structure and components of the display module for a new Apple product.
- Performed in-depth analysis on, and modeled screen burn-in for the OLED-based product.
- Defined the specifications of luminance-dependent colors based on user studies.
- Integrated the display module with multiple internal teams and vendors.

## EDUCATION

**University of Michigan, MI, USA**

- Ph.D. in Electrical and Computer Engineering Apr. 2017
  - Thesis: "Lifetime and efficiency of blue phosphorescent organic light-emitting diodes"
  - Advisor: Prof. Stephen R. Forrest
- M.S.E in Electrical Engineering May. 2013

**Seoul National University, Seoul, Korea**

- B.S. in Electrical and Computer Engineering *(Magna Cum Laude)* Feb. 2011
- Student Exchange Program at **Tsinghua University**, Beijing, China Fall, 2009
- Student Exchange Program at **Peking University**, Beijing, China Winter, 2009

## PUBLICATIONS

[1] K. Yang*, S. Nam*, J. Kim, E. Kwon, Y. Jung, H. Choi, J-W. Kim†, **J. Lee**†, "Effects of charge dynamics in the emission layer on the operational lifetimes of blue phosphorescent organic light-emitting diodes", *Advanced Functional Materials*, 2108595, 2022.

[2] S. Nam, J. Kim, H. Bae, Y. Maruyama, D. Jeong, J. Kim, J Kim, W-J. Son, H. Jeong, **J. Lee**, S-G. Ihn, H. Choi, "Improved Efficiency and Lifetime of Deep-Blue Hyperfluorescent Organic Light-Emitting Diode using Pt(II) Complex as Phosphorescent Sensitizer", *Advanced Science*, 8, 2100586, 2021.

[3] J. Kim, T. Batagoda, **J. Lee**, et al., "Systematic Control of the Orientation of Organic Phosphorescent Pt Complexes in Thin Films for Increased Optical Outcoupling", *Advanced Materials*, **31**, 1900921, 2019.

[4] **J. Lee**, C. Jeong, T. Batagoda, M. Thompson, S. Forrest, "Hot excited state management for long-lived blue phosphorescent organic light-emitting diodes", *Nature Communications*, **8**:15566, 2017.

[5] C. Coburn, **J. Lee**, S. Forrest, "Charge Balance and Exciton Confinement in Phosphorescent Organic Light-Emitting Diodes", *Advanced Optical Materials*, **4**, 889-895, 2016.

[6] **J. Lee**, H. Chen, T. Batagoda, C. Coburn, P. Djurovich, M. Thompson, S. Forrest, "Deep blue phosphorescent organic light-emitting diodes with very high brightness and efficiency", *Nature Materials*, **15**, 92, 2016.

[7] K. Lee, **J. Lee**, Bryan Mazor, S. Forrest, "Transforming the cost of solar-to-electrical energy conversion: Integrating thin-film GaAs solar cells with non-tracking mini-concentrators", *Light: Science and Applications*, **4**, e288, 2015.

[8] Y. Zhang, **J. Lee**, S. Forrest, "Tenfold increase in the lifetime of blue phosphorescent organic light-emitting diodes", *Nature Communications*, **5**:5008, 2014.

[9] **J. Lee**, M. Slootsky, K. Lee, Y. Zhang, S. Forrest, "An electrophosphorescent organic light-emitting concentrator", *Light: Science and Applications*, **3**, e181, 2014.

## US PATENT / PATENT APPLICATIONS

[1] S. Forrrest, **J. Lee**, Q. Burlingame, "Organic electroluminescent materials and devices", US 10,290,816 B2, 2019.

[2] S. Forrest, **J. Lee**, M. Thompson, "Organic electroluminescent devices", US Patent 10,074,815 B2, 2018.

[3] **J. Lee**, M. Slootsky, S. Forrest, "Electrophosphorescent Organic Light Emitting Concentrator", US Patent 9,853,247 B2, 2017.

[4] C. Coburn, **J. Lee**, S. Forrest, "Organic light-emitting diode having a mixed blocking layer", US 2017 / 0104172 A1.

## SELECTED TECHNICAL TALKS

[1] D. Ko, **J. Lee**, "Trap-dependent Electrical Characteristics of Organic Semiconductor Devices", *2020 SID Display week*, Online.

[2] **J. Lee**, "Fundamentals of long lifetime OLEDs", *2020 SID Display week*, Online.

[3] **J. Lee**, "Understanding on lifetime of organic light-emitting diodes", *IMID 2019*, Gyeongju, Korea.

[4] **J. Lee**, "Current status of phosphorescent OLEDs", *2019 KPS Spring Meeting*, Daejeon, Korea.

[5] **J. Lee**, H. Chen, X. Liu, C. Coburn, P. Djurovich, M. Thompson, S. Forrest,"Deep blue organic light-emitting diodes enabled by facial and meridional isomers of N-heterocyclic iridium complex", *2015 SPIE Optics and Photonics*, San Diego, CA, USA.

[6] **J. Lee**, Y. Zhang, S. Forrest, "Blue phosphorescent organic light-emitting diodes with a ten-fold improved operational lifetime", *2015 SPIE Photonics West*, San Francisco, CA, USA.

## HONORS AND AWARDS

- **ECE Best Lecture Award** Electromagnetics (Score: 4.80/5.00), Seoul National Univ. Spring. 2019
- **Runner-up Award** LNF Users Symposium, Univ. of Michigan Nov. 2015
- **Best Technical Poster Award** Engineering Graduate Symposium, Univ. of Michigan Nov. 2015
- **Merit-based graduate fellowship** awarded by Jeong-Song Culture Foundation 2011 – 2013
- **First president** of honor society in College of Engineering, Seoul National Univ. 2010 – 2011
- **National Science and Technology Scholarship** awarded by Korean government 2004 – 2010

## EXTRACURRICULAR ACTIVITIES

**STEM** 2010 – 2011
*President* *Seoul, Korea*

· First honor society in College of Engineering at Seoul National Univ.
· Led the organization with 15 selected members and made bylaws of the organization.
· Initiated a mentoring lecture program for 300+ high school students; >3,000 accumulated now.

**The 3rd Engineering Brigade, Republic of Korea Army** 2006 – 2008
*Sergeant* *Korea*

· Served in the national military as a wireless signaller and engineer.
· Participated in numerous field trainings including cold weather and ranger trainings.

## REFERENCE

**Dr. Stephen R. Forrest**
Peter A. Franken Distinguished University Professor; Paul G. Goebel Professor of Engineering
Department of Physics, Electrical and Computer Science, and Materials Science and Engineering
University of Michigan–Ann Arbor, USA
Email: Upon request