



# Yi Lu

## Basic Info

Yi Lu, Ph.D. Candidate

Advanced Semiconductor Laboratory

Electrical and Computer Engineering Program (ECE)

Division of Computer, Electrical, Mathematical Science and Engineering (CEMSE)

King Abdullah University of Science and Technology (KAUST)

Thuwal, Saudi Arabia 23955-6900

Email: [yi.lu@kaust.edu.sa](mailto:yi.lu@kaust.edu.sa) | KAUST Mobile: +966 544314798 | China Mobile: +86 15611529887

Webpages: [Laboratory](#) | [Google Scholar](#) | [LinkedIn](#) | [ResearchGate](#)

## Education

- **08/2019-present, King Abdullah University of Science and Technology, Saudi Arabia**
  - Ph.D. Candidate in Electrical and Computer Engineering
  - Research: Epitaxy, fabrication, characterization, and modeling of III-Nitride and III-Oxide based materials for optoelectronics and power electronics.
  - Ph.D. Advisor: [Prof. Xiaohang Li](#)
- **09/2016-06/2019, Institute of Semiconductors, Chinese Academy of Sciences, China**
  - M.S. in Electronic Science and Technology
  - Research: AlGaIn-based UV light emitting devices.
  - M.S. Advisor: [Prof. Jinmin Li](#), [Prof. Jianchang Yan](#)
- **09/2012-06/2016, Taiyuan University of Technology, China**
  - B.S. in Electronic Science and Technology, graduate with highest honor.

## Research Interests

- Ga<sub>2</sub>O<sub>3</sub> thin film membrane based optoelectronics and power electronics
- AlGaIn-based DUV light-emitting diodes
- Flexible wide bandgap semiconductor electronics

## Academic Research Summary

- >20 journal and conference publications including *ACS Applied Materials & Interfaces*, *ACS Photonics*, *Photonics Research*, *IEEE Photonics Journal*, *IEEE Photonics Technology Letters*, *Journal of Semiconductor*, *Acta Photonica Sinica*, *SPIE Photonics West*, etc.
- Journal Publications: 1<sup>st</sup> author × 6; 2<sup>nd</sup> author × 5; others × 9; under review/submission × 4.
- Conference Presentation: Oral talk × 8; Poster × 4.
- U.S. patents × 3.
- Certified reviewer for Publon; Reviewers of >25 times peer-review for scholarly journals.

## Academic Honors

- CEMSE Dean's List Award, Academic year 21/22 (Top 20%)
- Best poster award, Future of Semiconductors Forum, Riyadh, March 30-31, 2022
- 1<sup>st</sup> place winner in Oral Competition, KAUST Research Open Week, Nov 28 ~Dec 2, 2021.
- 2<sup>nd</sup> place winner in the Poster Competition, KAUST-Asia wide bandgap semiconductor workshop, 2019

## Volunteering activities

- KAUST CEMSE Student Ambassador, July, 2021 ~ Present, Saudi Arabia



- KAUST 12th Academic Convocation, Aug, 2021, Saudi Arabia
- KAUST “welcome buddies” program, 2020~2021, KAUST, Saudi Arabia
- Volunteer for distributing health kits with Consulate General of China in Jeddah, 2020, Saudi Arabia
- KAUST-Asia wide bandgap semiconductor workshop, Nov 29~30, 2020, KAUST, Saudi Arabia
- International workshop on UV materials and devices (IWUMD), Dec 7~9, 2018, Kunming, China

### **Professional Membership**

- OSA Student Chapter
- SPIE Student Chapter

### **Skills (Qualified with certificates)**

- **Epitaxy**
  - Pulsed laser deposition (PLD)
  - Metal-organic chemical vapor deposition (MOCVD)
- **Fabrication**

▪ Thin Film Deposition	Atomic Layer deposition	DC and RF Sputtering
▪ Wet Etching	Plasma Etching (RIE)	Photo Lithography
▪ Mask Layout Design	Direct Laser Writing	Rapid thermal annealing
- **Characterization**

▪ Ellipsometer	Filmetric	Scanning Electron Microscope
▪ Photoluminescence	Electroluminescence	Cathodoluminescence
▪ X-Ray Diffraction	Atomic Force Microscope	Uv-Vis spectrometer
▪ X-ray Photoelectron Spectroscopy	Profilometer	Raman Spectroscopy
▪ Infrared Spectroscopy (FTIR)	Reflectrometer	Kelvin probe force microscopy
▪ Secondary ion mass spectroscopy		
- **Software skills**
  - L-Edit / Mask design
  - TCAD simulation: APSYS, PICS3D, Silvaco
  - Matlab programming and calculations
  - Lumerical FDTD simulation
  - Film coating: TFcal

### **Journal Reviews Records**

- |   |   |
|---|---|
| 1. Photonics Research, OSA                | 2. Optics Express, OSA                        |
| 3. Optical Materials Express, OSA         | 4. IEEE Photonics Journal, IEEE               |
| 5. Optical Materials, Elsevier            | 6. Japanese Journal of Applied Physics, IOP   |
| 7. Applied Physics Express, IOP           | 8. Vacuum, Elsevier                           |
| 9. Optics Letters, OSA                    | 10. Thin solid films, Elsevier                |
| 11. IEEE Transactions on Electron Devices | 12. Optical and Quantum Electronics, Springer |

### **Journal Publications**

1. **Y. Lu**, S. Krishna, C-H. Liao, Z. Yang, M. Kumar, Z. Liu, X. Tang, N. Xiao, M. Hassine, S. Thoroddsen, and X. Li, "Transferrable Ga<sub>2</sub>O<sub>3</sub> Membrane for Vertical and Flexible Electronics via One-step Exfoliation," *ACS Applied Materials & Interfaces*. 14, 42, 47922–47930, 2022.
2. **Y. Lu**, S. Krishna, X. Tang, W. Babatain, M. Hassine, C-H. Liao, N. Xiao, Z. Liu, X. Li, "Ultrasensitive Flexible  $\kappa$ -Phase Ga<sub>2</sub>O<sub>3</sub> Solar-Blind Photodetector," *ACS Applied Materials & Interfaces*. 14, 30, 34844–34854, 2022.



3. **Y. Lu**, C. Wang, V. P. D. Oliveira, Z. Liu, and X. Li, "UV light-emitting diode with buried polarization-induced n-AlGaIn/InGaIn/p-AlGaIn tunneling junction," *IEEE Photonics Technology Letters*. 33, 16, 808-811, 2021.
4. Z. Ren\*, **Y. Lu\***, H. Yao, H. Sun, C.-H. Liao, J. Dai, C. Chen, J. H. Ryou, J. Yan, J. Wang, J. Li, and X. Li, "III-nitride Deep UV LED without Electron Blocking Layer," *IEEE Photonics Journal*. 11(2), 2019. (\* co-first author)
5. **Y. Lu**, J. Yan, X. Li, Y. Guo, Z. Wu, L. Zhang, W. Gu, J. Wang, and J. Li. "Carrier Manipulation and Performance Enhancement of N-polar AlGaIn-based LED with Grading Quantum Barriers," *Acta Photonica Sinica*, 48(7):0723001, 2019.
6. **Y. Lu**, H. Yao, J. Li, J. Yan, J. Wang, J. Li, and X. Li, "AlN/  $\beta$ -Ga<sub>2</sub>O<sub>3</sub> based HEMT: a potential pathway to ultimate high power device," *arXiv preprint*:1901.05111, 2019.
7. S. Krishna, **Y. Lu**, C-H. Liao, V. Khandelwal, X. Li, "Band alignment of orthorhombic Ga<sub>2</sub>O<sub>3</sub> with GaN and AlN semiconductors," *Applied Surface Science*. 599, 153901, 2022.
8. C. Wang, **Y. Lu**, C-H Liao, S Chandroth, S Yuvaraja, X Li, "Highly suppressed interface traps of Al<sub>2</sub>O<sub>3</sub>/GaIn through interposing a stoichiometric Ga<sub>2</sub>O<sub>3</sub> layer," *Japanese Journal of Applied Physics*. 61, 060906, 2022.
9. Z. Liu, **Y. Lu**, Y Wang, R Lin, C Xiong, X Li, "Polarization modulation at last quantum barrier for high efficiency AlGaIn-based UV LED," *IEEE Photonics Journal*. 14, 8210208, 2022.
10. Z. Liu, M. Nong, **Y. Lu**, H. Cao, S. Yuvaraja, N. Xiao, Z. ALNAKHLI, R. Vázquez, X. Li, "Effect of AlN strain compensation layer on InGaIn quantum well red light emitting diodes beyond epitaxy," *Optics Letters*, in press, 2022.
11. R. Lin, Z. Liu, P. Han, R. Lin, **Y. Lu**, H. Cao, X. Tang, C. Wang, V. Khandelwal, X. Zhang, X. Li, "Machine learning study on superlattice electron blocking layer design for AlGaIn deep ultraviolet light-emitting diodes using the stacked XGBoost/LightGBM algorithm," *Journal of Materials Chemistry C*, in press, 2022.
12. X. Tang, K.-H. Li, Y. Zhao, Y. Sui, H. Liang, Z. Liu, C-H. Liao, W. Babatain, L. Braic, R. Lin, C. Wang, **Y. Lu**, F. Alqatari, Z. Mei, W. Tang, X. Li, "Quasi-epitaxial Growth of  $\beta$ -Ga<sub>2</sub>O<sub>3</sub> Coated Wide Bandgap Semiconductor Tape for Flexible UV Photodetectors," *ACS Applied Materials & Interfaces*. 14, 1304, 2022.
13. W. Gu, **Y. Lu**, R. Lin, W. Guo, Z.-H. Zhang, J.-H. Ryou, J. Yan, J. Wang, J. Li, and X. Li, "BAIN for III-nitride UV light emitting diodes: undoped electron blocking layer," *Journal of Physics D: Applied Physics*. 54, 175104, 2021.
14. R. Lin, P. Han, Y. Wang, R. Lin, **Y. Lu**, Z. Liu, X. Zhang, and X. Li. "Low Resistance Asymmetric III-Nitride Tunnel Junctions Designed by Machine Learning." *Nanomaterials*. 11, 10, 2466, 2021.
15. M. Shan, Y. Zhang, M. Tian, R. Lin, J. Jiang, Z. Zheng, Y. Zhao, **Y. Lu**, Z. Feng, W. Guo, J. Dai, C. Chen, F. Wu, X. Li, "Transverse electric lasing at record short wavelength 244.63 nm from GaIn quantum wells with weak exciton localization," *ACS Photonics*, 8, 5, 1264–1270, 2021.
16. I. Ajia, D. Almalawi, **Y. Lu**, S. Lopatin, X. Li, Z. Liu, and I. Roqan, "Sub-quantum-well influence on carrier dynamics in high efficiency DUV dislocation-free AlGaIn/AlGaIn-based multiple-quantum-wells," *ACS Photonics*. 7, 7, 1667, 2020.
17. R. Lin, X. Liu, K. Liu, **Y. Lu**, X. Liu, X. Li, "BAIN alloy for enhanced two-dimensional electron gas characteristics of GaIn/AlGaIn heterostructures," *Journal of Physics D: Applied Physics*. 53, 48, 2020.
18. H. Yao, **Y. Lu**, K.-H. Li, C.-H. Liao, and X. Li, "Polarization matched c-plane III-nitride quantum wells structure," In Light-Emitting Devices, Materials, and Applications, Vol. 10940, p. 109400K. *International Society for Optics and Photonics*, 2019.



19. Z. Wu, J. Yan, Y. Guo, L. Zhang, **Y. Lu**, X. Wei, J. Wang, and J. Li, "Study of the morphology evolution of AlN grown on nano-patterned sapphire substrate," *Journal of Semiconductors*, 40, 12, 122803, 2019.
20. L. Zhang, Y. Guo, J. Yan, Q. Wu, **Y. Lu**, Z. Wu, W. Gu, X. Wei, J. Wang, and J. Li, "Deep Ultraviolet Light-emitting Diodes based on well-ordered AlGa<sub>N</sub> Nanorod Array," *Photonics Research*, 7(9): B66-B72, 2019.

### **Conference Proceedings and Presentations**

1. **Y. Lu**, S. Krishna, C-H. Liao, X. Tang, A. Almushaikeh, X. Li, "vdW-bond-assisted Exfoliation of Ga<sub>2</sub>O<sub>3</sub> Membrane for Vertical Configuration Electronics," **Poster**, The 4th International Workshop on Gallium Oxide and Related Materials, Nagano, Japan, Oct. 23~27, 2022.
2. **Y. Lu**, S. Krishna, C-H. Liao, X. Tang, N. Xiao, X. Li, "Centimeter-scale Freestanding Ga<sub>2</sub>O<sub>3</sub> Membrane by Thermal Exfoliation," **Poster**, The 4th International Workshop on Gallium Oxide and Related Materials, Nagano, Japan, Oct. 23~27, 2022.
3. **Y. Lu**, X. Li, "Advanced III-Oxide Semiconductor Membrane for Flexible/Vertical Electronics," **Oral**, Compound Semiconductor Weekend, KAUST, Sept 3~5, 2022.
4. **Y. Lu**, X. Li, "Advanced Ultrawide Bandgap Semiconductors for Ultraviolet Photonics," **Oral**, ECE Graduate Seminar, KAUST, April 17, 2022.
5. **Y. Lu**, S. Krishna, C-H. Liao, X. Tang, A. Almushaikeh, X. Li, "Flexible Ga<sub>2</sub>O<sub>3</sub> electronics and its vdW-bond-assisted exfoliation," **Poster**, Compound Semiconductor Week 2022, Ann Arbor, MI, June 1-3, 2022.
6. **Y. Lu**, S. Krishna, X. Tang, C-H. Liao, N. Xiao, X. Li, "Ultra-sensitive Flexible Solar-blind Ga<sub>2</sub>O<sub>3</sub> Photodetector," **Poster**, Future of Semiconductors Forum, Riyadh, March 30-31, 2022.
7. **Y. Lu**, X. Li, "Monolithic Integration of Deep Ultraviolet and Visible LEDs for Radiative Sterilization," **Oral**, KAUST Research Open Week, Nov 28 ~Dec 2, 2021.
8. **Y. Lu**, S. Krishna, C-H. Liao, A. Almushaikeh, X. Tang, X. Li, "Flexible Ga<sub>2</sub>O<sub>3</sub> electronics: from vdW epitaxy to membrane exfoliation," **Oral**, The 5th International Workshop on Ultraviolet Materials and Devices (IWUMD 2022), Jeju, South Korea, May 23~26, 2022.
9. **Y. Lu**, X. Li, "Ultraviolet Light-emitting Diodes with Buried Tunneling Junction," **Oral**, IEEE Photonics Conference, virtual conference, in LED Materials and Processes, Sept 28~Oct. 1, 2020.
10. **Y. Lu**, Z. Ren, H. Yao, C. Liao, X. Li, "Electron-blocking-layer-free deep ultraviolet light-emitting diode," **Oral**, SPIE Photonics West, San Francisco, United States, Feb 1~6, 2020.
11. **Y. Lu**, H. Yao, and X. Li. "AlN/[beta]-Ga<sub>2</sub>O<sub>3</sub>-based HEMT for high-power devices (Conference Presentation)," **Oral**, In Oxide-based Materials and Devices XI, vol. 11281, p. 112810M. International Society for Optics and Photonics, 2020.
12. **Y. Lu**, H. Yao, Z. Ren, H. Sun, C. Liao, X. Li, "Electron-blocking-layer-free DUV-LED with linearly graded AlGa<sub>N</sub> quantum barriers," **Oral**, SPIE Photonics West, San Francisco, United States, Feb. 2019.

### **U.S. Patents**

1. **Y. Lu**, X. Li, "Monolithic Integration of Deep Ultraviolet and Violet Light-emitting Diodes for Radiative Sterilization" (U.S. Application No. 63/357, 670)
2. **Y. Lu**, X. Li, "Type-II Heterostructure with All III-Nitrides for Red Light Emitting Diode" (U.S. Application No. 63/183, 224)
3. **Y. Lu**, X. Li, "Centimeter-scale Freestanding Ga<sub>2</sub>O<sub>3</sub> Membrane by Thermal Exfoliation" (U.S. Application No. 63/417, 760)