

# JINGYU LIN

**Linda F. Whitacre Endowed Chair and Horn Distinguished Professor**  
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## Professional Appointments

- **Linda F. Whitacre Endowed Chair and Paul Whitfield Horn Distinguished Professor**, Electrical and Computer Engineering, Texas Tech University (TTU), 2014 – current (Horn Distinguished Professorships, the highest honor TTU may bestow on members of its faculty)
- **Linda F. Whitacre Endowed Chair and Professor**, Electrical and Computer Engineering, Texas Tech University, 2008-2014
- **Co-Director**, Center for Nanophotonics, Texas Tech University (Center Formed 09/2010)
- **Professor of Physics**, Kansas State University, 2002-2008
- **Associate Professor of Physics**, Kansas State University, 1997-2002
- **Assistant Professor of Physics**, Kansas State University, 1992-1997
- **Assistant Professor of Physics**, University of Northern Iowa, 1991-1992
- **Research Associate**, Kansas State University, 1989-1991

## Education

- B. S. in Physics, State University of New York, College at Oneonta, 1980-1983
- M. S. in Physics, Syracuse University, 1983-1985
- Ph. D. in Physics, Syracuse University, 1985-1989

## Awards, honors, and special appointments

- Elected Fellow of the National Academy of Inventors (NAI), 2019
- Elected Fellow of the American Association for the Advancement of Science (AAAS), 2018
- Elected Fellow of the SPIE - the international society for optics and photonics, 2017
- Elected Fellow of the Optical Society (OSA), 2016
- Elected Fellow of the American Physical Society (APS), 2012
- Horn Distinguished Professor, Texas Tech University 2014 – present
- **Barnie E. Rushing, Jr. Faculty Distinguished Research Award**, TTU, 2014

- Linda F. Whitacre Endowed Chair, Texas Tech University, 2008 – current
- Member of Advisory Board of Science and Technology Council of Wenzhou, China, 2009-2013
- External Departmental Academic Advisor, Department of Applied Physics of The Hong Kong Polytechnic University (Hong Kong PolyU), 2016 – 2022
- Member of Selection Committee of the Adolph Lomb Medal, the Optical Society of America (OSA), 05/2019 - 02/2021.
- NSF Career Advancement Award, 1994
- Senate Research Award, Syracuse University, 1986
- B.S. degree with highest honor, SUNY at Oneonta, 1983

### **Key Accomplishments**

- Co-inventor of MicroLED and III-nitride self-emissive microdisplay (see e.g., [US patent 6,410,940](#) and [US patent 9,047,818](#); Nature Electronics **6**, 257 (2023); Appl. Phys. Lett. **116**, 100502 (2020); SPIE Newsroom Dec 2011; Appl. Phys. Lett. **78**, 1303 (2001); Appl. Phys. Lett. **76**, 631 (2000)). The MicroLED invention created the microLED display industry as well as the research field of microLED. MicroLED is considered the ultimate display technology and the most suitable candidate for VR/AR/3D displays.
- Co-invented in 2002 high-voltage AC/DC-LEDs via on-chip integration of micro- and mini-LED arrays. This invention extended LED's operating voltage from 2 or 3 V DC up to 100's V AC (see e.g., US patent [US6957899](#), [US7221044](#), etc.). Technology has been commercialized worldwide for general illumination and automobile headlights.
- Pioneered the development of the first deep UV picosecond time-resolved optical spectroscopy system (down to 195 nm). The system is capable to probe the static and dynamic recombination processes in semiconductors with ultrawide bandgaps with a ps time resolution. The design has helped the field to effectively characterize and advance ultrawide bandgap semiconductors and has been adopted by the photonic industries to benefit the communities at large (see e.g., Appl. Phys. Lett. **81**, 3365 (2002)).
- One of the first to experimentally determine the Mg acceptor energy level in AlN – Optically: Appl. Phys. Lett. **83**, 878 (2003); Electrically: Appl. Phys. Lett. **89**, 152120 (2006).
- Realized the 1<sup>st</sup> GaN photonic crystal LED - Appl. Phys. Lett. **83**, 1231 (2003); Appl. Phys. Lett. **84**, 466 (2004).
- First group to predict/demonstrate AlN is an edge-emitter (light emit in the TM mode) – Appl. Phys. Lett. **84**, 5264 (2004); Appl. Phys. Lett. **83**, 5163 (2003).
- Among the first to achieve conductivity control in Al-rich AlGaIn and AlN - Appl. Phys. Lett. **85**, 3769 (2004); Appl. Phys. Lett. **85**, 4669 (2004); Appl. Phys. Lett. **86**, 092108 (2005).
- Among the first to exploit III-nitride for solid-state energy devices (solar cells, thermoelectric devices, and PEC for hydrogen generation) - Appl. Phys. Lett. **92**, 042112 (2008); Appl. Phys. Lett. **94**, 063505 (2009); Appl. Phys. Lett. **96**, 052110 (2010).
- Pioneered the development of h-BN neutron detectors. Our research group has achieved h-BN thermal neutron detectors with a record high detection efficiency (at 60% to date) - Appl. Phys. Lett. **109**, 072101 (2016); Appl. Phys. Lett. **111**, 033507 (2017); J. Appl. Phys. **123**, 044501 (2018); Appl. Phys. Lett. **116**, 142102 (2020); J. Appl. Phys. **135**, 175704 (2024).
- The only group in the world possessing the capability for synthesizing h-BN quasi-bulk crystals (see e.g., Appl. Phys. Lett. **122**, 012105 (2023); J. Appl. Phys. **135**, 175704 (2024).
- Co-founder of III-N Technology, Inc. (3N) and AC-LED Lighting, LLC (AC-LED). 3N and AC-LED hold patent portfolios and facilitate the commercialization of microLED display and single-chip high voltage AC/DC LED technologies.

### **Professional and Scholarly Activities/Services**

- Panelist for NSF and German Research Foundation (DFG).

- External advisor for ARO MURI programs.
- Proposal reviewer for NSF, DOE, DOD, NRC, DFG, Dutch Technology Foundation, Polish Research Foundation, and Swiss National Science Foundation.
- Journal reviewer for Appl. Phys. Lett.; J. Appl. Phys.; Optics Express; Optical Materials Express; IEEE Trans. Electron Devices; IEEE J. Quantum. Electronics; IEEE Trans. Nuclear Science; J. Mat. Res.; IEEE Photonics Technology Letters; Thin Solid Films; ACS Nano; Applied Optics, J. Crystal Growth, Materials Letters, Physica Status Solidi, Light: Science & Applications, etc.
- Involved in the organization of 15 conferences/workshops, including organized and served as the chair for the 1st APS March Meeting Focused Session on Nanophotonics: Optical properties of nanostructures and nanophotonics, 2004.
- Delivered over 100 invited presentations at international conferences and universities.

### **Issued patents (23)**

- 1 “Micro-size LED and detector arrays for mini-displays, hyperbright light emitting diodes, lighting, and UV detector and imaging sensor applications”  
US patent 6,410,940 (filed: 06/15/2000; issued date: 06/25/2002)
- 2 “Micro-size LED and detector arrays for mini-displays, hyperbright light emitting diodes, lighting, and UV detector and imaging sensor applications,”  
Korean patent 100802764 (filed: 06/13/2001; priority date: 06/15/2000; issued date: 02/12/2008)
- 3 “Light emitting diodes for high AC voltage operation and general lighting”  
US patent 6,957,899 (filed: 10/24/2002; issued date: 10/25/2005)
- 4 “Light emitting diodes for high AC voltage operation and general lighting”  
US patent 7,210,819 (filed: 04/19/2005; issued date: 05/01/2007)
- 5 “Light emitting diodes for high AC voltage operation and general lighting”  
US patent 7,213,942 (filed: 05/03/2005; issued date: 05/08/2007)
- 6 “Nitride microlens” U.S. patent 7,193,784B2 (filed: 05/20/2004; priority date: 05/20/2003; issued date: 03/20/2007)
- 7 “Heterogeneous integrated high voltage DC/AC light emitter,” US patent 7,221,044 (filed: 01/21/2005; issued date: 05/22/2007)
- 8 “Micro-LED based high voltage AC/DC indicator lamp,” US patent 7,535,028 (filed: 04/08/2005; issued date: 05/19/2009)
- 9 “Micro-LED based high voltage AC/DC indicator lamp (基于微型发光二极管的高压交直流指示灯)” Chinese patent #1819255 (application date: 09/05/2005; priority date: 02/03/2005; issued date: 06/02/2010)
- 10 “Extreme ultraviolet (EUV) detectors based upon aluminum nitride (AlN) wide bandgap semiconductors,” US patent 7,498,645 (filed: 10/04/2007; priority date: 10/04/2006; issued date: 03/03/2009)
- 11 “Light emitting diode lamp capable of high AC/DC voltage operation,” US patent 8,272,757 (filed: 06/03/2005; issued date: 09/25/2012)
- 12 “AC/DC light emitting diodes with integrated protection mechanism,” US patent 7,714,348 (filed: 03/07/2007; priority date: 10/06/2006; issued date: 05/11/2010)
- 13 “Micro-emitter array based full-color microdisplay,” US patent 8,058,663 (filed: 09/26/2008; priority date: 09/26/2007; issued date: 11/15/2011)
- 14 “Er doped III-nitride materials and devices synthesized by MOCVD,” US patent 8,227,328 (filed: 08/24/2006; issued: 07/24/2012)
- 15 “CMOS IC for micro-emitter based microdisplay,” US patent 9,047,818 (filed: 03/12/2011; priority date: 03/23/2009; issued date: 06/02/2015)
- 16 “Structures and devices based on boron nitride and boron nitride-III-nitride heterostructures,” US patent 9,093,581 (filed: 05/29/2012; issued date: 07/28/2015)
- 17 “Charge storage imaging devices using persistent photoconductivity crystals” U.S. Patent #5,072,122.

- 18 "Persistent photoconductivity quenching effect crystals and electrical apparatus using same" U.S. Patent 5,101,109.
- 19 "Method and apparatus for use of III-Nitride wide bandgap semiconductors in optical communications" US patent 7,345,812.
- 20 "Solid-state neutron detectors," US patent 10,714,651 (filed: 10/25/2018; issued: 07/14/2020)
- 21 "Solid-state neutron detectors," US patent 11,195,968 B2 (filed: 01/10/2020; issued: 12/07/2021).
- 22 "Semiconductor optical phased arrays and methods related thereto," US patent 11,460,723 (filed: 12/04/2019; issued 10/04/2022).
- 23 "Semiconductor optical phased arrays and methods related thereto," US patent 11,747,658 (filed: 08/26/2022; issued 09/05/2023).

### **Patents pending (5)**

- 24 "Novel optical gain materials for high energy lasers and laser illuminators," US patent pending; Application 62,818,365.
- 25 "Semiconductor neutron detectors with ability for detecting thermal to fast neutrons," US patent pending; Application 63,319,988.
- 26 "Wide bandgap optical phased arrays (OPA's) and methods related thereto," US patent pending.
- 27 "Engineering C-band telecom-wavelength quantum defects in hexagonal boron nitride for quantum information technology," US patent, pending. Application 63,585,111
- 28 "Photoconductive switches based on AlN and BN ultrawide bandgap semiconductors," US provisional patent, filed 03/19/2024. Application 63/567,043.

### **Patent disclosures**

1. "Optical Hearing Device Based on Micro-LED Arrays".

### **Selective Press Coverage of Our Research Work**

Our group's research work on MicroLED has been reported in German, Japanese, Russian, French, Italian, Indian, British, Portuguese, and Chinese technical magazines, in addition to press releases by media outlets including The New York Times, CNN.com, ABCnews.com and USA Today. Our recent achievement of thermal neutron detectors with a record high detection efficiency based on B-10 enriched hexagonal boron nitride has been reported by various scientific and technical media outlets, including AIP, AAAS (EurekAlert), APS (Physics.org), Science Daily, PhysOrg, Newswise, German Radio, Semiconductor Today, Physics Today, etc. See also:

- MicroLED
- 2016-17 SPIE Women in Optics Planner
- In celebration of Women's History Month, ARPA-E is highlighting some of our trailblazing female project leaders!
- MicroLEDs: A Marriage of Brightness, Efficiency, and Possibility — With Hongxing Jiang & Jingyu Lin
- Shining a light on the future of microLEDs – Nature electronics **6**, 177 (2023).

### **List of Publications:**

Citations: 27,600; H-Index: 89 (according to [Google Scholar](#), as of 06/2024)  
 (\*indicating conference proceedings)

437. Z. Alemoush, A. Tingsuwatit, A. Maity, J. Li, J. Y. Lin, and H. X. Jiang, "Status of h-BN quasi-bulk crystals and high efficiency neutron detectors," J. Appl. Phys. **135**, 175704 (2024).

436. A. Tingsuwatit, N. K. Hossain, Z. Alemoush, M. Almohammad, J. Li, J. Y. Lin, and H. X. Jiang, "Properties of photocurrent and metal contacts of highly resistive ultrawide bandgap semiconductors," *Appl. Phys. Lett.* 124, 162105 (2024).
- 435 M. Almohammad, Z. Alemoush, J. Li, J. Y. Lin, and H. X. Jiang, "Carbon-related donor–acceptor pair transition in the infrared in h-BN," *Appl. Phys. Lett.* 124, 102106 (2024).
- 434 M. Almohammad, A. Tingsuwatit, Z. Alemoush, J. Li, J. Y. Lin, and H. X. Jiang, "Probing and controlling oxygen impurity diffusion in *h*-BN semi-bulk crystals," *Appl. Phys. Lett.* 123, 252106 (2023).
- 433 Z. Alemoush, A. Tingsuwatit, J. Li, J. Y. Lin, and H. X. Jiang, "Probing boron vacancy complexes in h-BN semi-bulk crystals synthesized by hydride vapor phase epitaxy," *Crystal* 13, 1319 (2023).
432. H. X. Jiang and J. Y. Lin, "How we made the microLED," *Nature Electronics* 6, 257 (2023).
431. Z. Alemoush, N. K. Hossain, A. Tingsuwatit, M. Almohammad, J. Li, J. Y. Lin, and H. X. Jiang, "Toward achieving cost-effective hexagonal BN semi-bulk crystals and BN neutron detectors via halide vapor phase epitaxy," *Appl. Phys. Lett.* 122, 012105 (2023).
430. Yuji Zhao, Mingfei Xu, Xuanqi Huang, Justin Lebeau, Tao Li, Dawei Wang, Houqiang Fu, Kai Fu, Xinqiang Wang, Jingyu Lin, and Hongxing Jiang, "Toward High Efficiency at High Temperatures: Recent Progress and Prospects on InGaN-Based Solar Cells," *Materials Today Energy*, 31, 101229, (2023). <https://doi.org/10.1016/j.mtener.2022.101229>.
429. A. Tingsuwatit, J. Li, J. Y. Lin, and H. X. Jiang, "Probing the bandgap and effects of t-BN domains in h-BN neutron detectors," *Applied Physics Express.* 15, 101003 (2022).
428. A. Tingsuwatit, A. Maity, S. J. Grenadier, J. Li, J. Y. Lin, and H. X. Jiang, "Boron nitride neutron detector with the ability for detecting both thermal and fast neutron," *Appl. Phys. Lett.* 120, 232103 (2022).
427. S. J. Grenadier, A. Maity, J. Li, J. Y. Lin, and H. X. Jiang, "Effects of unique band structure of h-BN probed by photocurrent excitation spectroscopy," *Applied Physics Express.* 15, 051005 (2022).
426. N. Khan, M. R. Uddin, J. Li, J. Y. Lin, and H. X. Jiang, "A conductive AFM study of carbon-rich hexagonal (BN)C semiconductor alloys," *MRS Communications* 12, 223 (2022).
425. Y. Q. Yan, J. Li, J. Y. Lin, and H. X. Jiang, "Effect of polarization field on optical transitions and selection rules in Er doped GaN," *Optical Materials Express* 12, 1122 (2022).
424. Y. Q. Yan, J. Li, J. Y. Lin, and H. X. Jiang, "Formation energy and optical excitation mechanisms of Er in GaN semi-bulk crystals," *Appl. Phys. Lett.* 120, 052103 (2022).
423. M. Almohammad, J. Li, J. Y. Lin, and H. X. Jiang, "Charge collection and trapping mechanisms in hexagonal boron nitride epilayers," *Appl. Phys. Lett.* 119, 221111 (2021).
422. Samuel Grenadier, Avishek Maity, Jing Li, Jingyu Lin, and Hongxing Jiang, "Electrical Transport Properties of Hexagonal Boron Nitride Epilayers," Chapter 12 in the book "Ultrawide Bandgap Semiconductors" Volume 107 in *Semiconductors and Semimetals 2021*. ISBN 0080-8784.
421. Hongxing Jiang and Jingyu Lin, "Development of nitride microLEDs and displays," Chapter 1 in "Micro LEDs," Volume 106 in *SEMICONDUCTORS AND SEMIMETALS*, edited by H. X. Jiang and J. Y. Lin, Academic Press (an imprint of Elsevier), 1st Edition (2021). ISBN: 9780128230411.
420. Hongxing Jiang and Jingyu Lin, "Micro LEDs," Volume 106 in *SEMICONDUCTORS AND SEMIMETALS*, edited by H. X. Jiang and J. Y. Lin, Academic Press, Hardcover ISBN: 9780128230411, 1st Edition, June (2021). ISBN: 9780128230411.
419. M. A. McKay, H. A. Al-Atabi, J. Li, J. H. Edgar, J. Y. Lin, and H. X. Jiang, "Band structure and ultraviolet optical transitions in ErN," *Appl. Phys. Lett.* 118, 131108 (2021).
418. J. Li, A. Maity, S. J. Grenadier, J. Y. Lin, and H. X. Jiang, "Charge collection in h-BN neutron detectors at elevated temperatures," *Appl. Phys. Lett.* 118, 092102 (2021).
417. A. Maity, S. J. Grenadier, J. Li, J. Y. Lin, and H. X. Jiang, "Hexagonal boron nitride: Epitaxial growth and device applications," *Prog. Quantum. Electron.* 76 100302 (2021).

416. Y. Q. Yan, T. B. Smith, J. Li, J. Y. Lin, and H. X. Jiang, "Erbium energy levels in GaN grown by hydride vapor phase epitaxy," *AIP Advances* **10**, 125006 (2020).
415. Q. W. Wang, J. Li, J. Y. Lin and H. X. Jiang, "Growth and properties of hexagonal boron nitride (h-BN) based alloys and quantum wells," chapter 20 in "Wide Bandgap Semiconductor-Based Electronics," edited by F. Ren and S. J. Pearton, IOP Publishing, Bristol, UK (2020). Online ISBN: 978-0-7503-2516-5; Print ISBN: 978-0-7503-2514-1
414. Z. Y. Sun, H. L. Gong, Y. Q. Yan, T. B. Smith, J. Li, J. Y. Lin, and H. X. Jiang, "Polarization-resolved Er emission in Er doped GaN bulk crystals," *J. Appl. Phys.* **127**, 243107 (2020).
413. M. A. McKay, Q. W. Wang, H. A. Al-Atabi, Y. Q. Yan, J. Li, J. H. Edgar, J. Y. Lin, and H. X. Jiang, "Band structure and infrared optical transitions in ErN," *Appl. Phys. Lett.* **116**, 171104 (2020).
412. A. Maity, S. J. Grenadier, J. Li, J. Y. Lin, and H. X. Jiang, "High efficiency hexagonal boron nitride neutron detectors with 1 cm<sup>2</sup> detection areas," *Appl. Phys. Lett.* **116**, 142102 (2020).
411. J. Y. Lin and H. X. Jiang, "Development of microLED," *Appl. Phys. Lett.* **116**, 100502 (2020).
410. Q. W. Wang, J. Li, J. Y. Lin, and H. X. Jiang, "Probing the surface oxidation process in hexagonal boron nitride epilayers," *AIP Advances* **10**, 025213 (2020).
409. V. X. Ho, Y. Wang, B. Ryan, L. Patrick, H. X. Jiang, J. Y. Lin, and N. Q. Vinh, "Observation of optical gain in Er-Doped GaN epilayers," *J. Lumin.* **221**, 117090 (2020).
408. M. A. McKay, J. Li, J. Y. Lin, and H. X. Jiang, "Anisotropic index of refraction and structural properties of hexagonal boron nitride epilayers probed by spectroscopic ellipsometry," *J. Appl. Phys.* **127**, 0531032 (2020).
407. B. Mitchell, D. Timmerman, W. Zhu, J. Y. Lin, H. X. Jiang, J. Poplawsky, R. Ishii, Y. Kawakami, V. Dierolf, J. Tatebayashi, S. Ichikawa, and Y. Fujiwara, "Direct detection of rare earth ion distributions in gallium nitride and its influence on growth morphology," *J. Appl. Phys.* **127**, 013102 (2020).
406. S. J. Grenadier, A. Maity, J. Li, J. Y. Lin, and H. X. Jiang, "Lateral charge carrier transport properties of B-10 enriched hexagonal BN thick epilayers," *Appl. Phys. Lett.* **115**, 072108 (2019).
405. Y. Q. Yan, Z. Y. Sun, W. P. Zhao, J. Li, J. Y. Lin, and H. X. Jiang, "Optical properties of GaN/Er:GaN/GaN core-cladding planar waveguides," *Appl. Phys. Expr.* **12**, 075505 (2019).
404. Z. Y. Sun, Y. Q. Yan, T. B. Smith, W. P. Zhao, J. Li, J. Y. Lin, and H. X. Jiang, "Growth and fabrication of GaN/Er:GaN/GaN core-cladding planar waveguide," *Appl. Phys. Lett.* **114**, 222105 (2019).
403. A. Maity, S. J. Grenadier, J. Li, J. Y. Lin, and H. X. Jiang, "High sensitivity hexagonal boron nitride lateral neutron detectors," *Appl. Phys. Lett.* **114**, 222102 (2019); doi: 10.1063/1.5098331.
402. Q. W. Wang, J. Li, J. Y. Lin, and H. X. Jiang, "Critical thickness of hexagonal GaBN/BN heterostructures," *Journal of Applied Physics*. **125**, 205703 (2019). doi.org/10.7567/1882-0786/aace8d
401. A. Maity, S. J. Grenadier, J. Li, J. Y. Lin, and H. X. Jiang, "Effects of surface recombination on the charge collection in h-BN neutron detectors," *J. Appl. Phys.* **125**, 104501 (2019).
400. Q. W. Wang, M. R. Uddin, X. Z. Du, J. Li, J. Y. Lin, and H. X. Jiang, "Synthesis and photoluminescence properties of hexagonal BGaN alloys and quantum wells," *Appl. Phys. Expr.* **12**, 011002 (2019). doi.org/10.7567/1882-0786/aace8d
399. Z. Y. Sun, Y. Q. Yan, W. P. Zhao, J. Li, J. Y. Lin, and H. X. Jiang, "Resonant excitation cross-sections of erbium in freestanding GaN bulk crystals," *Appl. Phys. Lett.* **112**, 202103 (2018). doi: 10.1063/1.5030347
398. S. J. Grenadier, A. Maity, J. Li, J. Y. Lin, and H. X. Jiang, "Origin and roles of oxygen impurities in hexagonal boron nitride epilayers," *Appl. Phys. Lett.* **112**, 162103 (2018). doi: 10.1063/1.5026291
- 397.\* Z. Y. Sun, Q. W. Wang, J. Li, J. Y. Lin, and H. X. Jiang, "Erbium-doped GaN bulk crystals as a gain medium for eye-safe high energy lasers," *Proc. SPIE* **10528**, Optical Components and Materials XV, 105280E (2018), invited. doi: 10.1117/12.2293166

396. V. X. Ho, T. M. Al tahtamouni, H. X. Jiang, J. Y. Lin, J. M. Zavada, and N. Q. Vinh, "Room-temperature lasing action in GaN quantum wells in the infrared 1.5  $\mu\text{m}$  region," *ACS Photonics* **5**, 1303 (2018). doi: [10.1021/acsphotonics.7b01253](https://doi.org/10.1021/acsphotonics.7b01253)
395. A. Maity, S. J. Grenadier, J. Li, J. Y. Lin, and H. X. Jiang, "Hexagonal boron nitride neutron detectors with high detection efficiencies," *J. Appl. Phys.* **123**, 044501 (2018). doi: [10.1063/1.5017979](https://doi.org/10.1063/1.5017979)
394. X. Z. Du, J. Li, J. Y. Lin, and H. X. Jiang, "Temperature dependence of the energy bandgap of multi-layer hexagonal boron nitride," *Appl. Phys. Lett.* **111**, 132106 (2017). doi: [10.1063/1.4994070](https://doi.org/10.1063/1.4994070)
393. S. Liu, R. He, Z. Ye, X. Z. Du, J. Y. Lin, H. X. Jiang, B. Liu, J. H. Edgar, "Large scale growth of high-quality hexagonal boron nitride crystals at atmospheric pressure from a Fe-Cr flux," *Cryst. Growth Des.* **17**, 4932 (2017). doi: [10.1021/acs.cgd.7b00871](https://doi.org/10.1021/acs.cgd.7b00871)
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390. J. Yang, F. Ren, R. Khanna, K. Bevlin, D. Geerapuram, L. C. Tung, J. Y. Lin, H. X. Jiang, J. Lee, E. Flitsiyan, L. Chernyak, S. J. Pearton, and A. Kuramata, "Annealing of dry etch damage in metallized and bare (-201)  $\text{Ga}_2\text{O}_3$ ," *J. Vac. Sci. Technol. B* **35**, 051201 (2017). doi: [10.1116/1.4986300](https://doi.org/10.1116/1.4986300)
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388. T. C. Doan, J. Li, J. Y. Lin, and H. X. Jiang, "Response of alpha particles in hexagonal boron nitride neutron detectors," *Appl. Phys. Lett.* **110**, 213502 (2017). doi: [10.1063/1.4984112](https://doi.org/10.1063/1.4984112)
387. M. R. Uddin, J. Li, J. Y. Lin, and H. X. Jiang, "Probing carbon impurities in hexagonal boron nitride epilayers," *Appl. Phys. Lett.* **110**, 182107 (2017). doi: [10.1063/1.4982647](https://doi.org/10.1063/1.4982647)
386. X. Z. Du, M. R. Uddin, J. Li, J. Y. Lin, and H. X. Jiang, "Layer number dependent optical properties of multilayer hexagonal BN epilayers," *Appl. Phys. Lett.* **110**, 092102 (2017). doi: [10.1063/1.4977425](https://doi.org/10.1063/1.4977425)
385. S. Butler, H. X. Jiang, J. Y. Lin, and A. Neogi, "Hyperspectral nonlinear optical light generation from a monolithic GaN microcavity," *Advanced Optical Materials*, **5**, 1600804 (2017). doi: [10.1002/adom.201600804](https://doi.org/10.1002/adom.201600804)
384. V. Ho, T. H. Dao, H. X. Jiang, J. Y. Lin, J. Zavada, S. McGill, and N. Vinh, "Photoluminescence quantum efficiency of Er optical centers in GaN epilayers," *Scientific Reports*, **7**, 39997 (2017). doi: [10.1038/srep39997](https://doi.org/10.1038/srep39997)
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10. J. Y. Lin and H. X. Jiang, "Electronic Structure and Dispersion of Compensated n-i-p-i Superlattices with Small Period Lengths," Phys. Rev. B 40, 5561 (1989).

9. H. X. Jiang and J. Y. Lin, "Persistent Photoconductivity and Related Critical Phenomena in  $\text{Zn}_{0.3}\text{Cd}_{0.7}\text{Se}$ ," *Phys. Rev. (Rapid Commun.) B* **40**, 10025 (1989).
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6. H. X. Jiang and J. Y. Lin, "Band Structure of Non-Ideal Semiconductor Superlattices," *Superlattices and Microstructures* **3**, 689 (1987).
5. H. X. Jiang and J. Y. Lin, "Band Structure of Superlattices with Graded Interfaces," *J. Appl. Phys.* **61**, 624 (1987).
4. H. X. Jiang and J. Y. Lin, "Band-structure of a periodic potential with 2 wells and 2 barriers per period," *Am. J. Phys.* **55**, 462 (1987).
3. H. X. Jiang and J. Y. Lin, "Superlattice with multiple layers per period," *Phys. Rev. B* **33**, 5851 (1986).
2. H. X. Jiang and J. Y. Lin, "The Ground State of a Particle under the Influence of a Uniformly Charged Sphere," *Am. J. Phys.* **54**, 1046 (1986).
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### **Invited reviews in scientific journals**

1. H. X. Jiang and J. Y. Lin, Book Review for "Properties of Advanced Semiconductor Materials: GaN, AlN, InN, BN, SiGe, by Michael E. Levinshtein, Serge L. Rumyantsev, and Michael S. Shur, Eds (John Wiley & Sons, New York, 2001), *MRS Bulletin*, Vol. **26**, 728 (2001).
2. H. X. Jiang and J. Y. Lin, "AlGaIn and InAlGaIn Alloys – Epitaxial Growth, Optical and Electrical Properties, and Applications," in a special issue of *Opto-Electronics Review*, **10**, 271 (2002), invited.
3. H. X. Jiang and J. Y. Lin, "Advances in III-Nitride Microstructures and Micro-Size Emitters," *J. of the Korean Physical Society*, **42**, S757 (2003).
4. J. Y. Lin and H. X. Jiang, "Recent Advances in III-Nitride Ultraviolet Photonic Materials and Devices," *J. of the Korean Physical Society*, **42**, S535 (2003).
5. J. Y. Lin, H. X. Jiang, and J. Zavada, "Nitride Photonic Crystals," Eighth International Symposium on Contemporary Photonics Technology, Tokyo, Japan (January 2005).
6. J. Y. Lin and H. X. Jiang, "III-nitride ultraviolet photonic materials – Epitaxial growth, optical and electrical properties, and applications," *Proceedings of SPIE on Quantum Sensing*, **4999**, 287 (2003).
7. H. X. Jiang & J. Y. Lin, "III-Nitride Quantum Devices – Microphotonics," *CRC Critical Reviews in Solid State and Materials Sciences*, (P. Holloway, Editor), **28**, 131 (2003).
8. Z. Y. Fan, J. Y. Lin, and H. X. Jiang, "III-nitride deep ultraviolet micro- and nano-photonics," *Proc. SPIE* **6127**, 61271C (2006).
9. Z. Y. Fan, J. Y. Lin, and H. X. Jiang, "Achieving conductive high Al-content AlGaIn alloys for deep UV photonics," *Proc. SPIE* **6479**, 64791I (2007).
10. Z. Y. Fan, J. Y. Lin, and H. X. Jiang, "III-nitride micro-emitter arrays: development and applications," *J. Phys. D: Appl. Phys.* **41**, 094001 (2008).
11. B. N. Pantha, J. Y. Lin, and H. X. Jiang, "III-nitride nanostructures for energy generation," *Proc. SPIE* **7608**, 76081I (2010).
12. H. X. Jiang and J. Y. Lin, "Semiconductor lasers: Expanding into blue and green," *Nature Photonics* **5**, 521 (2011).
13. S. Majety, X. K. Cao, R. Dahal, B. N. Pantha, J. Li, J. Y. Lin and H. X. Jiang, "Semiconducting hexagonal boron nitride for deep ultraviolet photonics," *Proc. SPIE* **8268**, 82682R (2012).
14. J. Day, J. Li, D. Y. C. Lie, C. Bradford, J. Y. Lin and H. X. Jiang, "Full-Scale Self-Emissive Blue and Green Microdisplays Based on GaN Micro-LED Arrays," *Proc. SPIE* **8268**, 82681X (2012).
15. X. K. Cao, S. Majety, J. Li, J. Y. Lin and H. X. Jiang, "Optoelectronic properties of hexagonal boron nitride epilayers," *Proc. SPIE* **8631**, 863128 (2013).
16. H. X. Jiang and J. Y. Lin, "Nitride micro-LEDs and beyond - a decade progress review," *Optics Express*, **21**, A475 (2013).

17. H. X. Jiang, and J. Y. Lin, "Hexagonal boron nitride for deep ultraviolet photonic devices," (in special section "Deep UV LEDs", Guest editors: Jung Han, Hiroshi Amano and Leo Scholwalter), *Semicon. Sci. Technol.* **29**, 084003 (2014).
18. H. X. Jiang and J. Y. Lin, "Review - Hexagonal Boron Nitride Epilayers: Growth, optical properties and device applications," *ECS J. Solid State Sci. Technol.* **6**, Q3012 (2017).
19. J. Y. Lin and H. X. Jiang, "Development of microLED," *Appl. Phys. Lett.* **116**, 100502 (2020).
20. A. Maity, S. J. Grenadier, J. Li, J. Y. Lin, and H. X. Jiang, "Hexagonal boron nitride: Epitaxial growth and device applications," *Prog. Quantum. Electron.* **76** 100302 (2021).
21. H. X. Jiang and J. Y. Lin, "How we made the microLED," *Nature Electronics* **6**, 257 (2023).

#### **Invited feature articles written for popular magazines**

1. H. X. Jiang and J. Y. Lin, "Microdisplays based on III-nitride wide band gap semiconductors," *oe magazine* (The Monthly Publication of SPIE-The internal Society for Optical Engineering), July 2001 issue, page 28.
2. H. X. Jiang and J. Y. Lin, "Advances in III-nitride micro-size light emitters," *III-Vs Review*, **14**, 35 (2001) [June/July 2001 issue].
3. H. X. Jiang, J. Y. Lin, R. Hui, and J. Zavada, "III-nitrides show promise for telecomm wavelengths," *Laser Focus World*, Nov. issue, S8 (2003).
4. J. Y. Lin, J. Day, J. Li, D. Lie, C. Bradford, and H. X. Jiang, "High-resolution group III-nitride microdisplays," *SPIE Newsroom*, Dec. issue (2011).

#### **Invited book chapters**

1. H. X. Jiang and J. Y. Lin, "Time-Resolved Photoluminescence Studies of GaN," A3.5 in "*Gallium Nitride and Related Compounds, EMIS Datareview Series*," Edited by J. Edgar, S. Strite, I. Akasaki, H. Amano, and C. Wetzel, (The Institute of Electrical Engineers, London, 1999).
2. H. X. Jiang and J. Y. Lin, "Persistent Photoconductivity in GaN," A3.6 in *Gallium Nitride and Related Compounds, EMIS Datareview Series*, Edited by J. Edgar, S. Strite, I. Akasaki, H. Amano, and C. Wetzel, (The Institute of Electrical Engineers, London, 1999).
3. H. X. Jiang and J. Y. Lin, "Persistent photoconductivity in III-nitrides," Chapter 5 in "*III-Nitride Semiconductors: Electrical, Structural and Defects Properties*" edited by M. O. Manasreh, (Elsevier Science, 2000).
4. H. X. Jiang, J. Y. Lin, and W. W. Chow "Time-Resolved Photoluminescence Studies of III-Nitrides," Chapter 1 in "*Optical Properties of III-Nitrides I*" edited by M. O. Manasreh and H. X. Jiang, (Taylor & Francis Books, New York & London 2002).
5. H. X. Jiang and J. Y. Lin, "III-Nitride Micro-Cavity Light-Emitters," – in "*Wide Bandgap Light-Emitting Materials and Devices*," edited by G.F. Neumark, I. Kuskovsky, and H. X. Jiang, published by Wiley –VCH Verlag GmbH, 2007.
6. H. X. Jiang and J. Y. Lin, "Carrier Dynamics Probed by Time-Resolved Photoluminescence," – in "*Ultrafast Dynamics Processes in Semiconductors*," Book Volume 92 – Topics in Applied Physics, edited by K. T. Tsen, published by Springer-Verlag Berlin, (Berlin Heidelberg, 2004).
7. H. X. Jiang & J. Y. Lin, "AlN Epitaxial Layers for UV Photonics" – Chapter 7 in "*Optoelectronic Devices: III-Nitride*," edited by M. Razeghi and M. Heini, published by Elsevier Ltd. (Amsterdam, 2004).
8. R. Dahal, J. Y. Lin, H. X. Jiang, and J. Zavada "Er doped  $\text{In}_x\text{Ga}_{1-x}\text{N}$  for optical communications," Chapter 5 in "*Rare-earth doped III-Nitrides for Optoelectronic and Spintronic Applications*," edited by K O'Donnell & V Dierolf, Canopus Academic Publishing Ltd and Springer SBM (2010).
9. J. Li, J. Y. Lin, H. X. Jiang, and N. Sawaki, "III-nitrides on Si substrate," Chapter 3 in "*III-V Compound Semiconductors: Integration with Silicon Based Microelectronics*," edited by T. Li, et al, published by CRC Press (Boca Raton 2010).

10. A. Sedhain, J. Y. Lin, and H. X. Jiang “AlN: Properties and Applications,” Chapter 2 in “*Handbook of Luminescent Semiconductor Materials*,” edited by L. Bergman and L. McHale, published in September 2011 by CRC Press, Taylor & Francis Group (ISBN: 1439834679).
11. N. Pantha, J. Y. Lin, and H. X. Jiang, “High quality Al-rich AlGa<sub>N</sub> alloys,” Chapter 2 in “*GaN and ZnO-based Materials and Devices*,” edited by S.J. Pearton, published in February 2012 by Springer, Springer Series in Materials Science (ISBN: 978-3-642-23520-7).
12. T. N. Oder, J. Y. Lin, and H. X. Jiang, “III-nitride photonics crystals for lighting applications,” Chapter 6 in “*Handbook of Microcavities*” (edited by A. H. W. Choi, Pan Stanford Publishing, 2015), ISBN 978-981-4463-24-9 (Hardcover), 978-981-4463-25-6 (ebook).
13. N. Nepal, H. X. Jiang, J. Y. Lin, B. Mitchell, V. Dierolf, and J. M. Zavada, "MOCVD growth of Er-doped III-N and optical-magnetic characterization," Chapter 7 in "*Rare Earth and Transition Metal Doping of Semiconductor Materials: Synthesis, Magnetic Properties and Room Temperature Spintronics*," edited by V. Dierolf, I. T. Ferguson, and J. M. Zavada, Woodhead Publishing, Elsevier, 2016, pp. 225-255.
14. Q. W. Wang, J. Li, J. Y. Lin, and H. X. Jiang, “Growth and properties of hexagonal boron nitride (h-BN) based alloys and quantum wells,” IOP e-book, to be published.
15. Hongxing Jiang and Jingyu Lin, “Development of nitride microLEDs and displays,” Chapter 1 in “Micro LEDs,” Volume 106 in SEMICONDUCTORS AND SEMIMETALS, edited by Hongxing Jiang and Jingyu Lin, Academic Press (an imprint of Elsevier), 1st Edition (2021). ISBN: 9780128230411.
16. Samuel Grenadier, Avisek Maity, Jing Li, Jingyu Lin, and Hongxing Jiang, “Electrical Transport Properties of Hexagonal Boron Nitride Epilayers,” Chapter 12 in “Ultrawide Bandgap Semiconductors,” Volume 107 in SEMICONDUCTORS AND SEMIMETALS (2021), edited by Yuji Zhao and Zetian Mi. Hardcover ISBN: 9780128228708. ScienceDirect

## Research Grants and Projects

### Funded projects conducted at TTU totaling ~ \$23 Million (2008 -):

1. **Ultra-wideband gap semiconductors for extrinsic photoconductive switching devices**, J. Y. Lin (P. I.) and H. X. Jiang (in partnership with Opcondys, Kyma, and Tektronix), DOE ARPA-E ([ULTRAFAST](#) program), \$3,070,735, 06/2024 -05/2027.
2. **Development of Cubic Boron Nitride (c-BN) Ultrawide Bandgap Semiconductors**, J. Y. Lin (P. I.) and H. X. Jiang, DOE ARPA-E ([CREATE](#) program), \$500,000, 10/2023 – 10/2025.
3. **Semiconductor Fast Neutron Detectors**, H. X. Jiang (P. I.) and J. Y. Lin, DOE ARPA-E ([2021 OPEN](#) program), \$1,789,998, 04/2022 – 05/2025.
4. **Large size wafers of erbium doped GaN crystals as high energy laser gain medium**, H. X. Jiang (P. I.) and J. Y. Lin, DOD DE-JTO/ONR ([MRI program](#)), \$3,000,370, 09/2017-01/2023.
5. **Erbium doped GaN crystals as high energy laser gain medium**, H. X. Jiang (P. I.) and J. Y. Lin, DOD DE-JTO/ONR ([MRI program](#)), \$2,000,000, 08/12 -08/2017.
6. **Wide bandgap semiconductor optical phased arrays (OPAs)**, J. Y. Lin, (P. I.), H. X. Jiang, C. Z. Li, and J. Li, DOD-JTO/AFRL ([Beam Control Research and Development](#)), \$2,521,963, 05/01/2019 - 11/2023.
7. **Boron nitride solid-state neutron detectors**, J. Y. Lin (P. I.) and H. X. Jiang, DOE ARPA-E ([IDEAS](#) program) \$500,000, 06/20-11/2022.
8. **Novel solid-state neutron detectors for geothermal and well logging**, J. Y. Lin (P. I.) and H. X. Jiang, DOE ARPA-E ([IDEAS](#) program), \$499,807, 06/18/2018-12/15/2019.
9. **Ultra-Compact Trace Organic Chemical & Water Ice Imager**, H. X. Jiang (P. I.) and J. Y. Lin, Photon Systems/NASA, \$285,000, 08/15/2017-08/14/2020.
10. **Fast neutron spectrometry, dosimetry, and directionality monitoring using semiconductor thin film detector arrays**, H. X. Jiang (P. I.) and J. Y. Lin, DOE/NNSA, \$450,000, 04/16-04/2020.
11. **Deep UV emitters and polariton lasers**, H. X. Jiang and J. Y. Lin, ARO, \$450,000, 03/16-10/2019.
12. **ARI-MA: Hexagonal Boron Nitride Based Neutron Detectors**, H. X. Jiang (P. I.) and J. Y. Lin, DHS/NSF (ARI), \$1,753,691, 09/15/2010 – 09/14/2015.
13. **Optical and electrical properties of III-nitrides and related materials**, H. X. Jiang (P. I.) and J. Y. Lin, DOE, \$569,000, 12/01/11 -11/30/2015.
14. **Layer-structured semiconductor alloys: growth, characterization, and applications**, J. Y. Lin (P. I.) and H. X. Jiang, NSF, \$450,000, 05/01/12 -04/30/2015.
15. **Erbium doped III-nitrides for optical communications and silicon photonics**, H. X. Jiang (P. I.) and J. Y. Lin, NSF, \$456,000, 07/12 -07/2015.
16. **Exploiting novel device structures for deep ultraviolet emitters**, J. Y. Lin (P. I.) and H. X. Jiang, NSF, \$324,919, 08/01/14 -07/31/2019.
17. **III-nitride research**, H. X. Jiang (P. I.) and J. Y. Lin, Saphlux, Inc., \$55,000, 06/15 -06/2017.
18. **Erbium doped GaN lasers by optical pumping**, J. Y. Lin (P. I.) and H. X. Jiang, ARO, \$64,619, 10/27/14 -10/26/2015.
19. **Nitride deep UV emitters with novel p-type layer approach**, H. X. Jiang (P. I.) and J. Y. Lin, DARPA-MTO ([CMUVT](#) program), \$1,239,169, 09/14/2010 – 09/15/2013.
20. **Bridging the miscibility gap in InGaN alloys**, J. Y. Lin (P. I.) and H. X. Jiang, NSF, \$475,183, 07/1/09 - 06/30/13.
21. **1.54 micron optical amplifiers and emitters based upon erbium doped III-nitrides grown on silicon**, H. X. Jiang (P. I.) and J. Y. Lin, NSF, \$328,011, 09/15/2008 – 09/14/2012.
22. **III-nitride 1.5 micron photonic devices on Si substrates**, H. X. Jiang (P. I.) and J. Y. Lin, ARO/STTR Phase I, \$31,000, 09/24/2010 –12/31/2011.
23. **Optical and electrical properties of III-nitrides and related materials**, H. X. Jiang (P. I.) and J. Y. Lin, DOE, \$474,000, 12/01/08 -11/30/2011.

24. **High Al-content AlGa<sub>N</sub> alloys for deep UV laser applications**, H. X. Jiang (P. I.) and J. Y. Lin, DARPA/ARO ([DUVAP](#) program), \$712,750, 09/15/08 - 01/14/11.
25. **AllInGa<sub>N</sub> band gap and doping engineering for visible laser diodes**, J. Y. Lin (P. I.) and H. X. Jiang, DARPA-MTO ([VIGIL](#) program), \$650,000, 09/01/2008 –11/30/2010.
26. **New types of photonic devices and structures**, H. X. Jiang (P. I.) and J. Y. Lin, US Army (Asian Office), \$30,000, 10/15/09 -10/14/10.
27. **DURIP-Erbium doped III-nitride nano-photonic structures grown on Si by MOCVD**, H. X. Jiang (P. I.) and J. Y. Lin, ARO, \$150,000, 05/15/09 -05/14/10.

**Funded projects conducted at Kansas State University (KSU) totaling ~ \$15 million (1992-2008)**

1. "AllInGa<sub>N</sub> bandgap and doping engineering for visible laser diodes," J. Y. Lin (P. I.) and H. X. Jiang, DARPA-MTO ([VIGIL](#) program), \$132,773, 09/01/2007 – 08/31/2008.
2. "High Al-content AlGa<sub>N</sub> alloys for deep UV laser applications," H. X. Jiang (P.I) & J. Y. Lin, DARPA-MTO ([DUVAP](#) program), \$270,379, 09/07-09/08.
3. "Workshop/Summer School 2008 on Wide-Bandgap Semiconductor Physics and Devices," H. X. Jiang (P.I) & J. Y. Lin, US Army International Technology Center, \$15,000.
4. "III-nitride deep ultraviolet photonic materials and structures" J.Y. Lin (P.I.) & H. X. Jiang, NSF, \$300,000, 05/01/05-04/30/08.
5. "III-nitrides for hydrogen fuel cell and thermopower technologies," H. X. Jiang (P.I) & J. Y. Lin, AFOSR, \$300,000, 06/15/06-06/14/09
6. "Rare earth doped III-nitrides for optical communications," Z. Y. Fan (P.I.), J. Y. Lin, and H. X. Jiang, \$661,250, ARO, 06/01/06-05/31/09.
7. "Optical and electrical properties of III-V nitrides and related materials," H. X. Jiang (P.I.) & J. Y. Lin, DOE, \$450,000, 10/15/2005-10/14/2008.
8. "Wide bandgap III-nitride micro- and nano-photonics," H. X. Jiang (P.I) & J. Y. Lin, ARO, \$625,743, 09/2003-09/2007.
9. "AlN based extreme ultraviolet (EUV) detectors," H. X. Jiang (P.I) & J. Y. Lin, NASA STTR through III-N Technology, Inc., \$33,333, 01/06 – 01/07.
10. "Erbium doped III-nitride materials and photonic structures for optical communications," J. Y. Lin (P. I.) and H. X. Jiang, NSF STTR through III-N Technology, Inc, \$30,000, 01/07 – 12/07.
11. "Instrumentation for III-nitride micro-photonics and electronics materials and devices research," J. Y. Lin & H. X. Jiang, DOD MDA, \$750,000, 8/03-8/06.
12. "III-nitride UV optoelectronic devices for bio-agents detection," H.X. Jiang (P.I.) and J. Y. Lin, DARPA-MTO ([SUVOS](#) program), \$1,400,000, 05/01/02 – 04/30/06.
13. "III-nitride wide bandgap semiconductors for optical communications," R. Hui (P.I. – University of Kansas), H. X. Jiang and J. Y. Lin, NSF, \$487,000, 11/01 – 08/06.
14. "Instrumentation for Growth of Rare Earth Doped III-Nitrides for Optical Communications," H.X. Jiang (P.I.) and J. Y. Lin, ARO, \$145,000, 05/05-05/06.
15. "MOCVD Growth of InGa<sub>N</sub>/Ga<sub>N</sub> Blue/Green LEDs" H. X. Jiang (P.I.) and J. Y. Lin, Saint-Gobain Company, \$50,000, 6/1/05-5/31/06
16. "MOCVD Growth of AlGa<sub>N</sub> UV Materials," H.X. Jiang (P.I.) and J. Y. Lin, NASA, \$25,000, 08/05 – 04/06.
17. "Optical and Electrical Properties of III-V Nitrides and Related Materials - Applications for solid-state lighting and chemical/biological agent detections," H. X. Jiang (P.I.) & J. Y. Lin, DOE, \$450,000, 10/15/2002-10/14/2005.
18. "Nitride Quantum Wells and Photonic Structures – Growth, Optical Studies, and Applications," J.Y. Lin (P.I.) & H. X. Jiang," NSF, \$491,884, 05/01/02-04/30/05.
19. "III-Nitrides Growth, Characterization, and Devices - for high power electronic device and deep UV sensor applications," J. Y. Lin (P.I.) & H. X. Jiang, DOD MDA ([Ga<sub>N</sub>PA](#) program), \$1,000,000, 07/27/2000-07/26/2005.

20. "Kansas Advanced Semiconductor Project," DOE-EPSCoR, \$900,000 over 3-years for advanced semiconductor cluster, H. X. Jiang, J. Y. Lin, and G. Wysin), ended 5/03.
21. "III-Nitride Micro- and Nano-Structures and Devices – Growth, Fabrication, and characterization," ARO, H.X Jiang (P.I.) & J. Y. Lin, \$250,010, ended 04/03.
22. "Instrumentation for III-Nitride Wide Bandgap Semiconductor Research," H. X. Jiang (P.I.) & J. Y. Lin, BMDO/ARO, \$399,532, ended 5/03.
23. "Instrumentation for AlGa<sub>N</sub>/Ga<sub>N</sub> Heterostructure Nano-Scale Electronic and Optoelectronic Device Fabrication," H. X. Jiang (P. I.) & J. Y. Lin, ONR, \$176,497, ended 04/30/03.
24. "Nitride Growth by MOCVD," H. X. Jiang (P.I.) & J. Y. Lin, Thomas Swan Scientific Equipment Ltd, \$164,800, 05/01 – 08/03.
25. "Fabrication and Optical Recombination in III-Nitride Microstructures and Devices," H. X. Jiang (P.I.) & J. Y. Lin, ARO, \$357,98, 06/19/2000-06/18/2003.
26. "Optical and Electrical Properties of III-V Nitrides and Related Materials," H. X. Jiang (P.I.) & J. Y. Lin, DOE, \$326,000, 09/15/1999-09/14/2002.
27. "III-Nitride UV Optoelectronic Devices - for Chem-Bio Agent Detection," H.X. Jiang (P.I.) & J. Y. Lin, DARPA-MTO, \$150,000, 07/2001-06/2002.
28. "Material and Device Characterization of Photoconductors," J. Y. Lin (P. I.) & H. X. Jiang, DOD/BMDO, \$100,000, 09/01/1999-08/31/2002.
29. "Picosecond Time-Resolved Spectroscopy System for Studying Deep UV Optical Transitions in AlGa<sub>N</sub> with High Al<sub>N</sub> Mole Fractions," J. Y. Lin (P.I.) & H. X. Jiang, BMDO/ARO, \$283,800, ended 03/02.
30. "Fabrication and Optical and Electrical Characterization of HFET Structures for High Power Transistor Applications," J. Y. Lin (P.I.) & H. X. Jiang, DOD-BMDO, \$200,000, 09/1999-08/2002.
31. "Mechanisms of Optical Transitions in AlGa<sub>N</sub> Alloys and Ga<sub>N</sub>/AlGa<sub>N</sub> Quantum Wells," J. Y. Lin (P.I.) & H. X. Jiang, NSF, \$421,979, 06/01/1999-05/01/2002.
32. "Picosecond Time-Resolved Studies of III-Nitride Materials and Structures," H. X. Jiang (P.I.) & J. Y. Lin, DOD, \$150,000, 04/01/1999-03/31/2002.
33. "Fabrication and Characterization of AlGa<sub>N</sub>/Ga<sub>N</sub> HFET Structures with High Al-Contents for High-Power Amplifier Applications," H. X. Jiang (P.I.) & J. Y. Lin, BMDO, \$250,000, 02/2000-01/09/2002.
34. "US-China Cooperative Research - Fabrication and Optical Studies of Ga<sub>N</sub> Microcavities", H. X. Jiang (P. I.) & J. Y. Lin, NSF, \$73,010, 03/15/1998-03/14/2001.
35. "Fabrication and Characterization of III-Nitride Microdisk Arrays," H. X. Jiang (P.I.) & J. Y. Lin, DOD, \$187,250, ended 05/01.
36. "Advanced Semiconductor Research Group in the State of Kansas," H. X. Jiang (P.I.), J. Edgar, J. Y. Lin, A. Rys, G. Wysin, K. Nordheden, R. Q. Hui, and J. Chaudhuri, NSF, 500,000, 8/99-8/02.
37. "Advanced Semiconductor Research Group in the State of Kansas," H. X. Jiang (P.I.), J. Edgar, J. Y. Lin, A. Rys, G. Wysin, K. Nordheden, R. Q. Hui, and J. Chaudhuri, Kansas Technology Enterprise Corporation, \$100,000, 8/99-8/02.
38. "Switching Characteristics of AlGa<sub>N</sub>/Ga<sub>N</sub> Heterojunction FETs," J. Y. Lin (P.I.) & H. X. Jiang, ONR, \$131,666, 4/98-3/01.
39. "Properties and Applications of In<sub>x</sub>Ga<sub>1-x</sub>N/Al<sub>y</sub>Ga<sub>1-y</sub>N Quantum Wells," H. X. Jiang (P.I.) & J. Y. Lin, DOD, \$112,170, 6/1/97 - 5/31/00.
40. "Characterization of Ga<sub>N</sub> Materials and High-Power Electronic Devices by Time-Resolved Photoluminescence and Hall Measurements," J. Y. Lin (P. I.) & H. X. Jiang, DOD, \$302,780, 8/1/97-7/31/00.
41. "Instrumentation for Studying Ultrafast Optical Processes in Ga<sub>N</sub> Quantum Wells and Devices - Application for High Power UV/Blue Lasers," H. X. Jiang (P.I.) & J. Y. Lin, DOD, \$210,250 ended 03/01.
42. "Picosecond Time-Resolved Spectroscopy System for Studying Deep UV Optical Transitions in AlGa<sub>N</sub> with High Al<sub>N</sub> Mole Fractions," J. Y. Lin (P.I.) & H. X. Jiang, DOD, \$247,500, ended 3/00.



43. "Optical and Electrical Properties of III-V Nitride Wide Band Gap Semiconductors," H. X. Jiang (P.I.) & J. Y. Lin, DOE, \$150,000, 9/15/96-9/14/99.
44. "Optical Properties and Optically-Pumped UV-Blue Laser Actions in GaN," H. X. Jiang (P.I.) & J. Y. Lin, DOD, \$372,135, 6/15/96 - 6/14/99.
45. "Dynamics of Optical Recombination in GaN and  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  - Applications for High Power Blue Lasers, H. X. Jiang (P.I.) & J. Y. Lin, DOD, \$280,000, 8/1/96 - 7/31/99.
46. "Instrumentation for Fabrication of GaN and AlGaN Microcavities –Applications for UV Microcavity lasers and Detectors," J. Y. Lin (P.I.) & H. X. Jiang, DOD, \$185,000, ended 6/99.
47. "Dynamics of Fundamental Optical Transitions in GaN and  $\text{Al}_x\text{Ga}_{1-x}\text{N}$ ," J. Y. Lin (P.I.) & H. X. Jiang, NSF, \$286,000, 7/96 - 6/99.
48. "Picosecond Optical Transitions and Carrier Dynamics in GaN," H. X. Jiang (P. I.) & J. Y. Lin, DOD, \$147,142, ended 2/98.
49. "Optical Properties of GaN Semiconductors," H. X. Jiang (P.I.) & J. Y. Lin, APA Optics, Inc., \$15,000, 1995.
50. "Exciton Transitions in Wide Bandgap Semiconductors," J. Y. Lin (P.I.), NSF, \$40,432, 1996.
51. "Nature of Quantum Localization Probed by Exciton Dynamics in II-VI Semiconductor Alloys," J. Y. Lin (P.I.), NSF Career Advancement Award, \$55,000, ended 06/96.
52. "Nanostructured SiC," NSF EPSCoR, J. Y. Lin (P.I.), \$30,000, ended 10/97.
53. "Advanced Materials Processing," NSF EPSCoR (P. Sherwood, C. Sorensen, and K. Klabunde, P.I.s) & J. Y. Lin (one of the 7 core members with share \$34,000), ended 06/97.
54. "Materials Synthesis and Characterization of Wide Bandgap Semiconductor," NSF EPSCoR, (P. Sherwood, C. Sorensen, and K. Klabunde, P.I.s, and J. Y. Lin one of the 14 core members with share \$45,000), ended 9/95.
55. "Physical Properties of Wide Bandgap Semiconductors," J. Y. Lin (P. I.), \$8,000, Alfred P. Sloan Foundation, ended 1994.