

**Yuchao Jiang**

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**Education**

- **Ph.D. in Electrical and Computer Engineering**, May 2016 @ University of Oklahoma, Norman, OK  
Dissertation: [High-performance InAs-based interband cascade lasers](#)
- **M.S. in Material Physics and Chemistry**, Jan. 2011 @ Chinese Academy of Sciences, Beijing, China  
Thesis: [Surface-emitting quantum cascade lasers](#)
- **B.S. in Applied Physics**, Jul. 2007 @ Beijing University of Posts and Telecomm., Beijing, China

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**Research interests and domain knowledge**

- Semiconductor laser modeling, including optical waveguide, quantum structure and rate equations.
- Design/implement novel structures to improve energy efficiency, far-field pattern, single-mode operation
- Build characterization setups for various purposes and physical interpretation for novel phenomenon
- High-performance quantum and interband cascade lasers
- Meteorological applications using multiple sensors, numerical weather prediction and machine learning

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**Professional Experiences**

**Reviewer** for several peer-reviewed journals:

- Applied Physics Letters
- Journal of Applied Physics
- Applied Optics
- IEEE Photonics Journal
- Infrared Physics and Technology

**Data Analyst**, Weathernews American Inc., Norman, OK

11/2017 - now

- Design novel quantum structures, standardize testing procedure and optimize overall system
- Collect and analyze laser, radar, satellite and other sensor data
- Build computer simulation models to improve flight safety and fuel efficiency
- Develop machine learning-based aviation forecasting using NWP data

**Research Assistant**, University of Oklahoma, Norman, OK

08/2010 – 05/2016

Worked with Prof. Rui Q. Yang, the inventor of interband cascade (IC) lasers

- First demonstration of InAs-based IC lasers with cw room temperature operation at  $\lambda \sim 4.6 \mu\text{m}$
- First demonstration of type-I IC lasers with cw operation above room temperature at  $\lambda \sim 3.2 \mu\text{m}$

- Improved the beam quality of InAs-based IC lasers by suppressing higher-order spatial modes
- Achieved a large electrical tunable range (280 cm<sup>-1</sup>) in IC laser by novel active region design
- First demonstration of InAs-based single-mode DFB IC lasers with a thin top cladding layer
- Developed a comprehensive model for the temperature dependence of threshold carrier density

**Research Assistant**, Chinese Academy of Sciences, Beijing, China

09/2007 – 07/2010

- First discovered blue-shift photoluminescence from porous InAlAs formed by electrochemistry etching, and explained this phenomenon by the quantum size effect
- Designed and fabricated surface-emitting quantum cascade lasers at  $\lambda \sim 4.6 \mu\text{m}$

## Conference Presentations

1. **Y. Jiang**, D. Makino, K. Sakamoto, “Can machine learning provide a short to fog prediction”, 18th Conf. on Artificial and Computational Intelligence and its Applications to the Environmental Sciences, in Phoenix, AZ (Jan. 6-10, 2019). [\[link\]](#)
2. **Y. Jiang**, L. Li, H. Ye, R. Q. Yang, T. D. Mishima, M. B. Santos, and M. B. Johnson, “Continuous-wave operation of InAs-based interband cascade lasers above room temperature”, Conf. on Lasers and Electro-Optics, in San Jose, California (May 10-15, 2015). [\[link\]](#)
3. **Y. Jiang**, L. Li, Z. Tian, R. T. Hinkey, R. Q. Yang, T. D. Mishima, M. B. Santos, *et al.*, “Room-temperature InAs-based interband cascade lasers”, Conf. on Lasers and Electro-Optics, in San Jose, California (May 6-11, 2012). [\[link\]](#)

## Patents

1. R. Q. Yang, Z. Tian, L. Li, M. B. Santos, M. B. Johnson, **Y. Jiang**, “Tunable semiconductor lasers”, Attorney Docket Number 4313-00400, granted on May 10, 2016. [\[Link\]](#)
2. **Y. Jiang**, J. Liu, Q. Lu, *et al.*, “Holographic method to fabricate short-wavelength surface-emitting quantum cascade lasers”. Patent publishing number: CN101916965A. Approval on Dec. 7, 2011.

## Publications

[Google Scholar](#), citations: 210, h-index: 8

1. L. Lei, L. Li, H. Lotfi, **Y. Jiang**, R. Q. Yang, M. B. Johnson, “Mid-wave interband cascade infrared photodetectors based on GaInAsSb absorbers”, Semicond. Sci. Technol., 31,105014 (2016) <https://doi.org/10.1088/0268-1242/31/10/105014>
2. H. Lotfi, L. Li, L. Lei, H. Ye, SM S. Rassel, **Y. Jiang**, R. Q. Yang, *et al.*, “High-frequency operation of a mid-infrared interband cascade system at room temperature”, Appl. Phys. Lett., 108, 201101 (2016). doi: [10.1063/1.4950700](https://doi.org/10.1063/1.4950700)
3. H. Lotfi, L. Li, L. Lei, **Y. Jiang**, R. Q. Yang, J. F. Klem, and M. B. Johnson, "Short-wavelength

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- interband cascade infrared photodetectors operating above room temperature", J. Appl. Phys., 119, 023105 (2016). [doi: 10.1063/1.4939961](https://doi.org/10.1063/1.4939961)
4. **Y. Jiang**, L. Li, H. Ye, R. Q. Yang, T. D. Mishima, M. B. Santos, M. B. Johnson, *et al.*, "InAs-based single-mode distributed feedback interband cascade lasers", IEEE J. Quantum Electron., 51, 2300307 (2015). [doi: 10.1109/JQE.2015.2470534](https://doi.org/10.1109/JQE.2015.2470534)
  5. L. Li, **Y. Jiang**, H. Ye, R. Q. Yang, T. D. Mishima, M. B. Santos, and M. B. Johnson, *et al.*, "Low-threshold InAs-based interband cascade lasers operating at high temperatures", Appl. Phys. Lett., 106, 251102 (2015). [doi: 10.1063/1.4922995](https://doi.org/10.1063/1.4922995)  
*\*Reported as "research highlights" in Nat Photon, 9, 481 (2015). [doi:10.1038/nphoton.2015.147](https://doi.org/10.1038/nphoton.2015.147)*
  6. **Y. Jiang**, L. Li, R. Q. Yang, J. A. Gupta, G. C. Aers, E. Dupont, J.-M. Baribeau, *et al.*, "Type-I interband cascade lasers near 3.2  $\mu\text{m}$ ", Appl. Phys. Lett., 106, 041117 (2015). [doi:10.1063/1.4907326](https://doi.org/10.1063/1.4907326)
  7. L. Li, H. Ye, **Y. Jiang**, R. Q. Yang, J. C. Keay, T. D. Mishima, M. B. Santos, and M. B. Johnson, "MBE-grown long-wavelength interband cascade Lasers on InAs Substrates," J. of Crystal Growth, 426, 369 (2015). [doi: 10.1016/j.jcrysgro.2015.02.016](https://doi.org/10.1016/j.jcrysgro.2015.02.016)
  8. R. Q. Yang, L. Li, and **Y. Jiang**, "Interband cascade lasers: from original concept to practical devices", Progress in Physics, 34, 169 (2014). <http://pip.nju.edu.cn/Home/ShowArticle/774>
  9. **Y. Jiang**, L. Li, Z. Tian, H. Ye, L. Zhao, R. Q. Yang, T. D. Mishima, *et al.*, "Electrically widely tunable interband cascade lasers," J. of Appl. Phys., 115, 113101 (2014).  
[doi:10.1063/1.4865941](https://doi.org/10.1063/1.4865941)
  10. C. H. Jia, Y. H. Chen, **Y. C. Jiang**, F. Q. Liu, S. C. Qu, W. F. Zhang, and Z. G. Wang, "Photoluminescence properties of porous InP filled with ferroelectric polymers", Applied Physics A, 111, 695 (2013). [doi:10.1007/s00339-013-7717-0](https://doi.org/10.1007/s00339-013-7717-0)
  11. L. Li, L. Zhao, **Y. Jiang**, R. Q. Yang, J. C. Keay, T. D. Mishima, M. B. Santos, and M. B. Johnson, "Single-waveguide dual-wavelength interband cascade lasers", Appl. Phys. Lett., 101, 171118 (2012).  
[doi: 10.1063/1.4764910](https://doi.org/10.1063/1.4764910)
  12. Z. Tian, **Y. Jiang**, L. Li, R. T. Hinkey, Z. Yin, R. Q. Yang, T. D. Mishima, *et al.*, "InAs-based mid-infrared interband cascade lasers near 5.3  $\mu\text{m}$ ", IEEE J. Quantum Electron., 48, 915 (2012). [doi: 10.1109/JQE.2012.2195477](https://doi.org/10.1109/JQE.2012.2195477)
  13. Z. Yin, **Y. Jiang**, Z. Tian, R. Q. Yang, T. D. Mishima, M. B. Santos, and M. B. Johnson, "Far-field patterns of plasmon waveguide interband cascade lasers", IEEE J. Quantum Electron., 47, 1411 (2011). [doi: 10.1109/JQE.2011.2168812](https://doi.org/10.1109/JQE.2011.2168812)
  14. **Y. Jiang**, F. Liu, L. Wang, W. Yin, and Z. Wang, "Blue-shift photoluminescence from porous InAlAs". Semicond. Sci. Technol., 25, 115006 (2010). [doi:10.1088/0268-1242/25/11/115006](https://doi.org/10.1088/0268-1242/25/11/115006)