WEILU GAO

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Department of Electrical and Computer Engineering, MS-378
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POSITION

Rice University 6/2016 –
Postdoctoral Research Associate
Advisor: Junichiro Kono

EDUCATION

Rice University 12/2013 – 6/2016
Ph.D. in Electrical and Computer Engineering
Thesis: Wafer-Scale Films and Devices of Spontaneously Aligned Carbon Nanotubes
Advisor: Junichiro Kono

Rice University 9/2011 – 12/2013
M.S. in Electrical and Computer Engineering
Thesis: Graphene Photonic Devices for Terahertz and Mid-Infrared
Advisor: Qianfan Xu

Shanghai Jiao Tong University 9/2007 – 7/2011
B.S. in Electrical Engineering, GPA: 3.9/4.0, Rank: 1/200+

PUBLICATIONS

Google Scholar Citations (10/2018): >1600, h-index $=17$, i10-index $=19$

`https://scholar.google.com/citations?user=5v99W3kAAAAJ&hl=en`

**equal contributions*, †*corresponding author*

1. **Gao, W.**†; Kono, J.; "Science and Applications of Wafer-Scale Crystalline Carbon Nanotube Films Prepared through Controlled Vacuum Filtration," (*Invited review*) *Royal Society of Open Science, under review.*
2. Katsutani, F.; **Gao, W.**; Li, X.; Ichinose, Y.; Yomogida, Y.; Yanagi, K.; Kono, J.; "Direct Observation of Cross-Polarized Excitons in Aligned Single-Chirality Single-Wall Carbon Nanotubes," *Physical Review B, under review.*
3. **Gao, W.***; Doiron, C.*; Li, X.; Kono, J.; Naik, G., "Macroscopically Aligned Carbon Nanotubes as a Refractory Platform for Hyperbolic Thermal Emitters," *Proceedings of the National Academy of Sciences, under review.*
4. Wang, X.; **Gao, W.**; Li, X.; Zhang, Q.; Nanot, S.; Haroz, E.; Kono, J.; Rice, W. D.,"Magneto-Transport in Type-Enriched Single-Wall Carbon Nanotube Networks," *Physical Review Materials, accepted.*
5. Sui, C.; Yang, Y.; Headrick, R.; Pan, Z.; Wu, J.; Zhang, J.; Jia, S.; Li, X.; **Gao, W.**; Dewey, O.; Wang, C.; He, X.; Kono, J.; Pasquali, M.; Lou, J.; "Directional Sensing Based on Flexible Aligned Carbon Nanotube Film Nanocomposites," *Nanoscale* 10 (2018), pp. 14938-14946.

6. **Gao, W.**; Li, X.; Bamba, M.; Kono, J., "Continuous Transition between Weak and Ultrastrong Coupling through Exceptional Points in Carbon Nanotube Microcavity Exciton Polaritons," *Nature Photonics* 12 (2018), pp. 362-367.

7. Li, X.; Bamba, B.; Zhang, Q.; Fallahi, S.; Gardner, G.; **Gao, W.**; Lou, M.; Yoshioka, K.; Manfra, M.; Kono, J., "Vacuum Bloch-Siegert Shift in Landau Polaritons with Ultrahigh Cooperativity," *Nature Photonics* 12 (2018), pp. 324-329.

8. Yanagi, K.; Okada, R.; Ichinose, Y.; Yomogida, Y.; Katsutani, F.; **Gao, W.**; Kono, J., "Intersubband Plasmons in the Quantum Limit in Gated and Aligned Carbon Nanotubes," *Nature Communications* 9 (2018), 1121.

9. Xu, Z.; Qiu, C.; Yang, Y.; Zhu, Q.; Jiang, X.; Zhang, Y.; **Gao, W.**; Su, Y., "Ultra-Compact Tunable Silicon Nanobeam Cavity with an Energy-Efficient Graphene Micro-Heater," *Optics Express* 25 (2017), pp. 19479-19486.

10. He, X.; Hartmann, N. F.; Ma, X.; Kim, Y.; Ihly, R.; Blackburn, J. L.; **Gao, W.**; Kono, J.; Yomogida, Y.; Hirano, A.; Tanaka, T.; Kataura, H.; Htoon, H.; Doorn, S. K., "Tunable Room-Temperature Single-Photon Emission at Telecom Wavelengths from sp^3 Defects in Carbon Nanotubes," *Nature Photonics* 11 (2017), pp. 577-582.

11. Komatsu, N.; **Gao, W.**†; Chen, P.; Guo, C.; Babakhani, A.; Kono, J., Modulation-Doped Multiple Quantum Wells of Aligned Single-Wall Carbon Nanotubes, *Advanced Functional Materials* 27 (2017), 1606022.

12. Hirano A.; **Gao, W.**; He, X.; Kono, J., "Destabilization of Surfactant-Dispersed Carbon Nanotubes by Anions," *Nanoscale Research Letters* 12 (2017), 81.

13. Zhang, Q.; Wang, Y.; **Gao, W.**; Long, Z.; Watson, J. D.; Manfra, M. J.; Belyanin, A.; Kono, J., "Stability of High-Density Two-Dimensional Excitons against a Mott Transition in High Magnetic Fields Probed by Coherent Terahertz Spectroscopy," *Physical Review Letters* 117 (2016), 207402.

14. Krottenmller, M.; **Gao, W.**; Anis, B.; Kono, J.; Kuntscher, C. A., "High-Pressure Optical Study of Small-Diameter Chirality-Enriched Single-Wall Carbon Nanotubes," *physica status solidi (b)* 253 (2016), pp. 2446-2450.

15. He, X.*; **Gao, W.***; Xie, L.; Li, B.; Zhang, Q.; Lei, S.; Robinson, J.; Haroz, E.; Doorn, S.; Wang, W.; Vajtai, R.; Ajayan, P.; Adams, W.; Hauge. R.; Kono, J., "Wafer-Scale Monodomain Films of Spontaneously Aligned Single-Walled Carbon Nanotubes," *Nature Nanotechnology* 11 (2016), pp. 633-638.

16. Qiu, C.; Pan, T.; **Gao, W.**; Liu, R.; Su, Y.; Soref, R., "Proposed High-Speed Micron-Scale Spatial Light Valve Based on a Silicon-Graphene Hybrid Structure," *Optics Letters* 40 (2015), pp. 4480-4483.

17. **Gao, W.**; Wang, X.; Chen, R.; Eason, D. B.; Strasser, G.; Bird, J. P.; Kono, J., "Electroluminescence from GaAs/AlGaAs Heterostructures in Strong In-Plane Electric Fields: Evidence for k- and Real-Space Charge Transfer," *ACS Photonics* 2 (2015), pp. 1155-1159.

18. Yuan, J.; Wu, J.; Hardy, W.; Loya, P.; Lou, M.; Yang, Y.; Najmaei, S.; Jiang, M.; Qin, F.; Keyshar, K.; Ji, H.; **Gao, W.**; Bao, J.; Kono, J.; Natelson, D.; Ajayan, P.; Lou, J., "Facile Synthesis of Single Crystal Vanadium Disulfide Nanosheets by Chemical Vapor Deposition for Efficient Hydrogen Evolution Reaction," *Advanced Materials* 27 (2015), pp. 5605-5609.

19. Sun, X.; Qiu, C.; Wu, J.; Zhou, H.; Pan, T.; Mao, J.; Yin, X.; Liu, R.; **Gao, W.**; Fang, Z.; Su, Y., "Broadband Photodetection in a Microfiber-Graphene Device," *Optics Express* 23 (2015), pp. 25209-25216.

20. Li, B.; Shi, G.; Lei, S.; He, Y.; **Gao, W.**; Gong, Y.; Ye, G.; Zhou, W.; Keyshar, K.; Hao, J.; Dong, P.; Ge, L.; Lou, J.; Kono, J.; Vajtai, R.; and Ajayan, P. M., "3D Band Diagram and Photoexcitation of 2D-3D Semiconductor Heterojunctions," *Nano Letters* 15 (2015), pp. 5919-5925.

21. He, X.; **Gao, W.**; Zhang, Q.; Ren, L.; Kono, J., "Carbon-Based Terahertz Devices," *Proceedings of SPIE 9476*, Automatic Target Recognition XXV (2015), 947612. (*Invited article*)

22. Xie, L.*; **Gao, W.***; Shu, J.; Ying, Y.; Kono, J., "Extraordinary Sensitivity Enhancement by Metasurfaces in Terahertz Detection of Antibiotics," *Scientific Report* 5 (2015), 8671.

23. Xu, W.; Xie, L.; Ye, Z.; **Gao, W.**; Yao, Y.; Chen, M.; Qin, J.; Ying, Y., "Discrimination of Transgenic Rice Containing the Cry1Ab Protein Using Terahertz Spectroscopy and Chemometrics," *Scientific Report* 5 (2015), 11115.

24. Chen, R.; **Gao, W.**; Wang, X.; Aizin, G. R.; Mikalopas, J.; Arikawa, T.; Tanaka, K.; Eason, D. B.; Strasser, G.; Kono, J.; Bird, J. P., "High-Voltage Breakdown and the Gunn Effect in GaAs/AlGaAs Nanoconstrictions," *IEEE Transactions on Nanotechnology* 14 (2015), pp. 524-530.

25. Lei, S.; Wen, F.; Ge, L.; Najmaei, S.; George, A.; Gong, Y.; **Gao, W.**; Jin, Z.; Li, B.; Lou, L.; Kono, J.; Vajtai, R.; Ajayan, P. M.; Halas, N. J., "An Atomically Layered InSe Avalanche Photodetector," *Nano Letters* 15 (2015), pp. 3048-3055.

26. Qiu, C.*; **Gao, W.***; Vajtai, R.; Ajayan, P. M.; Kono, J.; Xu, Q., "Efficient Modulation of 1.55 m Radiation with Gated Graphene on a Silicon Microring Resonator," *Nano Letters* 14 (2014), pp. 6811-6815.

27. **Gao, W.**; Zhang, Q.; Ren, L.; Jin, Z.; Kim, J. H.; Kono, J., "Terahertz and Ultrafast Dynamics of Carriers and Phonons in Graphene and Carbon Nanotubes," *Proceedings of SPIE 8984*, Ultrafast Phenomena and Nanophotonics XVIII (2014), 89840K. (*Invited article*)

28. **Gao, W.***; Shu, J.*; Reichel, K.; Nickel, D. V.; He, X.; Shi, G.; Vajtai, R.; Ajayan, P. M.; Kono, J.; Mittleman, D. M.; Xu, Q., "High-Contrast Terahertz Wave Modulation by Gated Graphene Enhanced by Extraordinary Transmission through Ring Apertures," *Nano Letters* 14 (2014), pp. 1242-1248.

29. Qiu, C.; **Gao, W.**; Soref, R.; Robinson, J. T.; Xu, Q., "Reconfigurable Electro-optical Directed-Logic Circuit using Carrier-Depletion Micro-ring Resonators," *Optics Letters* 39 (2014), pp. 6767-6770.

30. Shu, J.; **Gao, W.**; Reichel, K.; Nickel, D.; Dominguez, J.; Brener, I.; Mittleman, D. M.; Xu, Q., "High-Q Terahertz Fano Resonance with Extraordinary Transmission in Concentric Ring Apertures," *Optics Express* 22 (2014), pp. 3747-3753.

31. Shi, G.; Hanlumyuang, Y.; Liu, Z.; Gong, Y.; **Gao, W.**; Li, B.; Kono, J.; Lou, J.; Vajtai, R.; Sharma, P., "Boron Nitride-Graphene Nanocapacitor and the Origins of Anomalous Size-Dependent Increase of Capacitance," *Nano Letters* 14 (2014), pp. 1739-1744.

32. Najmaei, S.; Zou, X.; Er, D.; Li, J.; Jin, Z.; **Gao, W.**; Zhang, Q.; Park, S.; Ge, L.; Lei, S.; Kono, J.; Shenoy, V. B.; Yakobson, B. I.; George, A.; Ajayan, P. M.; Lou, J., "Tailoring the Physical Properties of Molybdenum Disulfide Monolayers by Control of Interfacial Chemistry," *Nano Letters* 14 (2014), pp. 1354-1361.

33. He, X.; Fujimura, N.; Lloyd, J. M.; Erickson, K.; Zhang, Q.; **Gao, W.**; Jiang, Q.; Kawano, Y.; Hauge, R. H.; Leonard, F.; Kono, J., "Carbon Nanotube Terahertz Detector," *Nano Letters* 14 (2014), pp. 3953-3958.

34. Gong, Y.; Shi, G.; Zhang, Z.; Zhou, W.; Jung, J.; **Gao, W.**; Ma, L.; Yang, Y.; Yang, S.; You, G., "Direct Chemical Conversion of Graphene to Boron- and Nitrogen- and Carbon-Containing Atomic Layers," *Nature Communications* 5 (2014), 3193.

35. **Gao, W.***; Shi, G.*; Jin, Z.; Shu, J.; Zhang, Q.; Vajtai, R.; Ajayan, P. M.; Kono, J.; Xu, Q., "Excitation and Active Control of Propagating Surface Plasmon Polaritons in Graphene," *Nano Letters* 13 (2013), pp. 3698-3702.

36. Xia, Y.; Qiu, C.; Zhang, X.; **Gao, W.**; Shu, J.; Xu, Q., "Suspended Si Ring Resonator for Mid-IR Application," *Optics Letters* 38 (2013), pp. 1122-1124.

37. Shu, J.; **Gao, W.**; Xu, Q., "Fano Resonance in Concentric Ring Apertures," *Optics Express* 21 (2013), pp. 11101-11106.

38. **Gao, W.**; Shu, J.; Qiu, C.; Xu, Q.,"Excitation of Plasmonic Waves in Graphene by Guided-mode Resonances," *ACS Nano* 6 (2012), pp. 7806-7813.

PRESENTATIONS

1. "Aligned and Packed Single-Wall Carbon Nanotubes as Hyperbolic Thermal Emitters," Conference on Lasers and Electro-Optics (CLEO), QELS-Fundamental Science, San Jose, CA, U.S.A., May 2018.

2. "Microcavity Exciton Polaritons with Exceptional Points Induced by Polarization-Controllable Ultrastrong Coupling," Conference on Lasers and Electro-Optics (CLEO), QELS-Fundamental Science, San Jose, CA, U.S.A., May 2018.

3. "Science and Applications of Wafer-Scale Aligned Carbon Nanotubes," Seminar, Department of Electrical and Computer Engineering, The George Washington University, Washington, DC, U.S.A., March 2018. (*Invited*)

4. "Recent Progress Toward Single Crystals of Single-Wall Carbon Nanotubes," 231st Electrochemical Society (ECS), New Orleans, LA, U.S.A., June 2017. (*Invited*)

5. "Spontaneous Alignment of Carbon Nanotubes in Vacuum Filtration: Fabrications and Applications," Guadalupe Workshop VIII, San Antonio, TX, U.S.A., April 2017. (*Invited*)

6. "Polarization-Dependent Terahertz Spectroscopy of Macroscopically Aligned Carbon Nanotubes," Conference on Lasers and Electro-Optics (CLEO), Science and Innovations, San Jose, CA, U.S.A., May 2015.

7. "Demonstration of Reconfigurable Electro-Optical Directed-Logic Circuit by Carrier Depletion Micro-ring Resonators," Conference on Lasers and Electro-Optics (CLEO), Science and Innovations, San Jose, CA, U.S.A., May 2015.

8. "Electronic and Optoelectronic Devices based on Chirality-Enriched Wafer-Scale Single-Wall Carbon Nanotube Thin Films," American Physical Society (APS) March Meeting, San Antonio, TX, U.S.A., March 2015.

9. "Polarization-Dependent Terahertz Spectroscopy of Macroscopically Aligned Carbon Nanotubes," 3rd International Doctoral Student Symposium on Material Science, Sapporo, Hokkaido, Japan, February 2015.

10. "Nonlinear Current-Voltage Characteristics of GaAs/AlGaAs Nanoconstrictions Driven by the Gunn Effect," 5th International Symposium on Terahertz Nanoscience (TeraNano V), Martinique, France, December 2014.

11. "Electroluminescence from a GaAs/AlGaAs Heterostructure at High Electric Fields: Evidence for Real-& k-Space Transfer," Conference on Lasers and Electro-Optics (CLEO), QELS: Fundamental Science, San Jose, CA, U.S.A., June 2014.

HONORS AND AWARDS

National Scholarship for Outstanding Self-Financed Students Abroad, Chinese Government	2016
ECE Department Fellowship, Rice University	2011 – 2013
Shanghai Excellent Graduate Student	2011
National Scholarship for Undergraduates (3 times)	2008 – 2010
People's Scholarship (1st class), Shanghai Jiao Tong University (3 times)	2008 – 2010

REFEREEING

Journals: Advanced Materials, Nature Communications, Carbon, ACS Photonics, Nanotechnology, Optics Express, Optics Letters, Applied Physics Letters, Journal of Lightwave Technology, Optical Materials Express, Journal of Physics D, Journal of Applied Physics, Sensors, Optics & Laser Technology, Optical Communications, Materials Research Express

TEACHING

Teaching Assistant, Rice University

ELEC 462 Optoelectronic Devices (UG&G)	Fall 2014
ELEC 361 Quantum Mechanics for Engineers (UG)	Spring 2014
ELEC 462 Optoelectronic Devices (UG&G)	Fall 2013