

# XU ZHANG

## EDUCATION

---

Ph.D.	<b>Massachusetts Institute of Technology</b> Department of Electrical Engineering and Computer Science, Thesis Co-advisor: Prof. Mildred Dresselhaus, Prof. Tomás Palacios	2017.06
M.S.	<b>Massachusetts Institute of Technology</b> Department of Electrical Engineering and Computer Science,	2012.09
B.S.	<b>University of Science and Technology of China (USTC)</b> Department of Physics, <i>Summa Cum Laude</i>	2010.07

## PROFESSIONAL EXPERIENCES

---

Assistant Professor (tenure-track)	<b>Carnegie Mellon University</b> Department of Electrical and Computer Engineering	2019.00 – present
Argonne Scholar	<b>Argonne National Laboratory</b>	2018.06 – 2019.07
Postdoctoral Associate	<b>Massachusetts Institute of Technology</b> Microsystems Technology Laboratories	2017.06 – 2018.06
Intern	<b>IBM Watson Research Center</b>	2016.06 – 2016.09

## ACADEMIC AWARDS

---

- MIT Technology Review 35 Innovators Under 35 (Global list) 2022
- MIT Technology Review 35 Innovators Under 35 (China list) 2019
- Enrico Fermi Fellowship 2018
- MIT Presidential Fellowship (Massachusetts Institute of Technology) 2010
- MIT Global Fellowship (Massachusetts Institute of Technology) 2014
- Chinese National Scholarship (twice) 2007 & 2008
- Guo Moruo Scholarship (Highest honor for undergrads in USTC) 2008

## SELECTED PUBLICATIONS (Google Scholar Citation: 2555; since 2017: 2224; h-index: 18; i-10 index: 19)

---

- [1] **Zhang, X.**; Grajal, J.; Vazquez-Roy, J.L.; Radhakrishna, U.; Wang, X.; Chern, W.; Zhou, L.; Lin, Y.; Shen, P.; Ji, X.; Ling, X.; Zubair, A.; Zhang, Y.; Wang, H.; Dubey, M.; Kong, J.; Dresselhaus, M. S.; Palacios, T. Two-dimensional MoS<sub>2</sub>-enabled Rectenna for Wi-Fi Band Wireless Energy Harvesting. **Nature**, 2019, 566, 368-372. (*Featured by Scientific American, The Guardian, Yahoo! News, El País, Yahoo! Finance USA, Tech XPlore, etc*)
- [2] **Zhang, X.**; Medina, L.; Cai, H.; Aksyuk, V.; Espinosa, H. D.; Lopez, D. Kirigami Engineering—Nanoscale Structures Exhibiting a Range of Controllable 3D Configurations. **Adv. Mater.**, 33, 5, 2005275 (2021)
- [3] **Zhang, X.**; Grajal, J.; López-Vallejo, M.; McVay, E.; Palacios, T. Opportunities and Challenges of Ambient Radio-Frequency Energy Harvesting. **Joule Future Energy** (2020). <https://doi.org/10.1016/j.joule.2020.05.006>.
- [4] Lin, Y.; Ma, Q.; Shen, P.-C.; Ilyas, B.; Bie, Y.; Liao, A.; Ergecen, E.; Han, B.; Mao, N.; **Zhang, X.**; Zhang, Y.; Yin, J.; Huang, S.; Dresselhaus, M.; Gedik, N.; Jarillo-Herrero, P.; Ling, X.; Kong, J.; Palacios, T. Asymmetric Hot-

Carrier Thermalization and Broadband Photoresponse in Graphene-2D Semiconductor Lateral Heterojunctions. **Sci. Adv.** 2019, 5 (6), eaav1493. <https://doi.org/10.1126/sciadv.aav1493>.

[5] Wang, X.; **Zhang, X.**; Sun, L.; Lee, D.; Yang, S.; Dinca, M.; Palacios, T.; Gleason, K.; High Electrical Conductivity and Carrier Mobility in oCVD PEDOT Thin Films by Engineered Crystallization. **Science Advances**, Vol. 4, no. 9, eaat5780. (2018) DOI: 10.1126/sciadv.aat5780

[6] **Zhang, X.**; Schiros, T.; Nordlund, D.; Shin, Y. C.; Kong, J.; Dresselhaus, M.; Palacios, T. X-Ray Spectroscopic Investigation of Chlorinated Graphene: Surface Structure and Electronic Effects. **Adv. Funct. Mater.** 2015, 25, 4163–4169.

[7] **Zhang, X.**; Hsu, A.; Wang, H.; Song, Y.; Kong, J.; Dresselhaus, M. S.; Palacios, T. Impact of Chlorine Functionalization on High-Mobility Chemical Vapor Deposition Grown Graphene. **ACS Nano** 2013, 7, 7262–7270.

(Featured by *Nanotechweb* and *PhysicsWorld*)

[8] **Zhang, X.**; Grajal, J.; Wang, X.; Radhakrishna, U.; Zhang, Y.; Kong, J.; Dresselhaus, M.; Palacios, T.; MoS<sub>2</sub> Phase-junction-based Schottky Diodes for RF Electronics. **IEEE MTT-S International Microwave Symposium-IMS**; 2018; pp 345-347.

[9] Wang, H.; Yu, L.; **Zhang, X.**; Mailly, B.; Mackin, C.; Kong, J.; Palacios, T. Two-Dimensional Materials for Ubiquitous Electronics. **IEEE MTT-S International Microwave Symposium Digest (MTT)**; 2013; pp.1-3.

[10] Yu, L.; Zubair, A.; Santos, E. J. G.; **Zhang, X.**; Lin, Y.; Zhang, Y.; Palacios, T. High-Performance WSe<sub>2</sub> Complementary Metal Oxide Semiconductor Technology and Integrated Circuits. **Nano Lett.** 2015, 15, 4928–4934.

[11] Zhou, L.; Zubair, A.; Wang, Z.; **Zhang, X.**; Ouyang, F.; Xu, K.; Fang, W.; Ueno, K.; Li, J.; Palacios, T.; Kong, J.; Dresselhaus, M.S. Synthesis of High-Quality Large-Area Homogenous 1T' MoTe<sub>2</sub> from Chemical Vapor Deposition. **Advanced Materials** 2016, Vol.28, 43, 9526-9531.

[12] Zhou, L.; Xu, K.; Zubair, A.; **Zhang, X.**; Ouyang, F.; Palacios, T.; Dresselhaus, M.S.; Li, Y.; Kong, J. Role of Molecular Sieves in the CVD Synthesis of Large-Area 2D MoTe<sub>2</sub>. **Adv. Funct. Mater.** 2017, 27, 1603491

[13] Hong, J.Y.; Yun, S.; Wie, J.J.; **Zhang, X.**; Dresselhaus, M.S.; Kong, J.; Park, H.S. Cartilage-inspired Superelastic Ultradurable Graphene Aerogels Prepared by the Selective Gluing of Intersheet Joints. **Nanoscale**, 2016, 8, 12900-12909.

[14] Hirschmann, T. C.; Araujo, P. T.; Muramatsu, H.; **Zhang, X.**; Nielsch, K.; Kim, Y. A.; Dresselhaus, M. S. Characterization of Bundled and Individual Triple-Walled Carbon Nanotubes by Resonant Raman Spectroscopy. **ACS Nano** 2013, 7, 2381–2387.

[15] Hsu, A.; Wang, H.; Shin, Y. C.; Mailly, B.; **Zhang, X.**; Yu, L.; Shi, Y.; Lee, Y. H.; Dubey, M.; Kim, K. K.; et al. Large-Area 2-D Electronics: Materials, Technology, and Devices. **Proc. IEEE** 2013, 101, 1638–1652.

[16] Ling, X.; Fang, W.; Lee, Y.-H.; Araujo, P. T.; **Zhang, X.**; Rodriguez-Nieva, J. F.; Lin, Y.; Zhang, J.; Kong, J.; Dresselhaus, M. S. Raman Enhancement Effect on Two-Dimensional Layered Materials: Graphene, H-BN and MoS<sub>2</sub>. **Nano Lett.** 2014, 14, 3033–3040.

[17] Zhang, Y.; Sun, M.; Piedra, D.; Azize, M.; **Zhang, X.**; Fujishima, T.; Palacios, T. GaN-on-Si Vertical Schottky and P-N Diodes. **IEEE Electron Device Lett.** 2014, 35, 618–620.

[18] Ling, X.; Lin, Y.; Ma, Q.; Wang, Z.; Song, Y.; Yu, L.; Huang, S.; Fang, W.; **Zhang, X.**; Hsu, A.; Bie, Y.; Lee, Y.; Zhu, Y.; Wu, L.; Li, J.; Jarillo-Herrero, P.; Dresselhaus, M.; Kong, J.; Palacios, T. Parallel Stitching of 2D Materials. **Advanced Materials** 2016, Vol.28, 12, 2322-2329.

[19] Zhang, Y.; Liu, Z.; Tadjer, M.; Sun, M.; Piedra, D.; Hatem, C.; Anderson, T.; Luna, L.; Nath, A.; Koehler, A.; Okumura, H.; Hu, J.; **Zhang, X.**; Gao, X.; Feigelson, B.; Hobart, K.; Palacios, T. Vertical GaN Junction Barrier Schottky Rectifiers by Selective Ion Implantation. **IEEE Electron Device Lett.** 2017, 38, 1097-1110.

[20] Song, Y.; Li, X.; Mackin, C.; **Zhang, X.**; Fang, W.; Palacios, T.; Zhu, H.; Kong, J. Role of Interfacial Oxide in High-Efficiency Graphene–Silicon Schottky Barrier Solar Cells. **Nano Lett.** 2015, 15, 2104–2110.

[21] Zhu, L.; Yang, T.; Zhong, Y.; Jin, Z.; Zhang, X.; Hu, C.; Wang, Z.; Wu, Z.; Zhang, Z.; Shi, Z.; Kong, J.; **Zhang, X.**; and Zhou, L. Scalable and Versatile Transfer of Sensitive Two-Dimensional Materials. *Nano Lett.* (Under Review)

[22] **Zhang, X.**; Schiros, T.; Nordlund, D.; Shin, Y.C.; Kong, J.; Dresselhaus, M.S.; Palacios, T. NEXAFS study on Chlorinated Graphene through Plasma-based Surface Functionalization. **American Physical Society March Meeting, 2015**, San Antonio, TX.

[23] **Zhang, X.**; Wang, H.; Song, Y.; Hsu, A.; Kong, J.; Dresselhaus, M.S.; Palacios, T. Surface Fluorination on Graphene Field Effect Transistors. **American Physical Society March Meeting, 2014**, Denver, CO.

- [24] **Zhang, X.**; Song, Y.; Hsu, A.; Kim, K. K.; Kong, J.; Dresselhaus, M.; Palacios, T. Surface functionalization on graphene through chlorination. **American Physical Society March Meeting, 2013**, Baltimore, MD.
- [25] **Zhang, X.**; Jia, X.; Cruz-Silva, E.; Wang, L.-P.; Campos-Delgado, J.; Araujo, P. A.; Meunier, V.; Terrones, M.; Palacios, T.; Dresselhaus, M. “Dynamics of Graphene Edges Interaction under Joule-heating”. **American Physical Society March Meeting, 2012**, Boston, MA.
- [26] **Zhang, X.**; Kim, K.K.; Kong, J.; Dresselhaus, M.S.; Palacios, T. “Impact of Chlorination on Graphene Devices”. **Materials Research Society Fall Meeting, 2012**, Boston, MA
- [27] Cai, H.; Srinivasan, S.; **Zhang, X.**; Czaplewski, D.; Martinson, A.; Gosztola, D.; Stan, L.; Loeffler, T.; Sankaranarayanan, S.; López, D. “Inverse design of ultrathin dielectric metasurfaces”. **Conference on Optical MEMS and Nanophotonics 2019**, KAIST, Daejeon, Korea
- [28] **Zhang, X.**; Grajal, J.; Vazquez-Roy, J.L.; Radhakrishna, U.; Wang, X.; Chern, W., Zhou, L.; Wang, H.; Dubey, M.; Kong, J.; Dresselhaus, M. S.; Palacios, T. “MoS<sub>2</sub>-based Rectenna for Wi-Fi Band Wireless Energy Harvesting”, **SPIE**, August 11, 2019, San Diego, USA

## ACADEMIC SERVICES

---

**Associate Guest Editor**, for journal *Thin Solid Films*, *Frontiers in Materials*

**Peer Review**, for academic journals, including *Nature Nanotechnology*, *Physical Review B*, *IEEE Electron Device Letters*, *Nature Electronics*, *Advanced Optical Materials*, *npj Computational Materials*, *ACS Applied Materials & Interfaces*, *2D Materials*, and *Physical Review Applied*, *IEEE Transactions on Nanotechnology*, *physica status solidi (b)*, *Applied Physics A*, *Nanotechnology*, *Thin Solid Films*, and *Journal of Physics D: Applied Physics*

**Organization Committee** of MIT Microsystems Annual Research Conference (MARC)

**Organization Committee** of 2022 Materials Research Society (MRS) Fall Meeting, Symposium EQ06, Two-Dimensional (2D) van der Waals Materials - Quantum Properties and Electronic and Photonic Devices, Boston, Massachusetts, November 27 - December 2, 2022

## TEACHING

---

### Undergraduate Course:

18-220: Electronic Devices and Analog Circuits (Units: 12), Department of Electrical and Computer Engineering, Carnegie Mellon University

### Graduate Course:

18-819D: Special Topics in Applied Physics: Memory Devices and Technology (Units: 12), Department of Electrical and Computer Engineering, Carnegie Mellon University