

# Kaichen Dong

## Contact information

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## Professional Experience

2024/01 – Now	Director, Intelligent Passive Thermal Control Center (IPTCC) Research Institute of Tsinghua University in Shenzhen	Shenzhen, China
2023/09 – Now	Deputy Director, Center of Double Helix (CDH) Tsinghua Shenzhen International Graduate School Tsinghua University	Shenzhen, China
2023/02 – Now	Assistant Professor, Tsinghua-Berkeley Shenzhen Institute (TBSI) Institute of Data and Information (iDI), Tsinghua Shenzhen International Graduate School Tsinghua University	Shenzhen, China
2022/11 – 2023/02	Assistant Professor, Tsinghua-Berkeley Shenzhen Institute (TBSI) Tsinghua Shenzhen International Graduate School Tsinghua University	Shenzhen, China
2019/03 – 2022/09	Affiliate in Materials Science Division Lawrence Berkeley National Laboratory Supervisor: Professor Junqiao Wu	Berkeley, CA, USA
2019/02 – 2022/09	Postdoctoral Researcher in Materials Science and Engineering University of California, Berkeley Advisors: Professor Junqiao Wu, Professor Jie Yao	Berkeley, CA, USA
2017/10 – 2019/01	Research Associate in Precision Instrument Tsinghua University Supervisor: Professor Zheng You	Beijing, China

## Education

2015/07 – 2016/12	Affiliate in Materials Science Division Lawrence Berkeley National Laboratory Supervisor: Professor Junqiao Wu	Berkeley, CA, USA
2014/12 – 2016/12	Visiting Ph.D. student in Materials Science and Engineering University of California, Berkeley Advisors: Professor Junqiao Wu, Professor Jie Yao	Berkeley, CA, USA
2012/09 – 2017/10	Ph.D. in Precision Instrument Tsinghua University Advisor: Professor Zheng You	Beijing, China
2008/08 – 2012/07	B.E. in Precision Instrument Tsinghua University	Beijing, China

## Research Interests

Temperature-adaptive Radiative Cooling  
Moiré Photonics, Metamaterials/Metasurfaces, AI-assisted design  
Zero-power MEMS Devices  
Phase-change Materials

## Awards and Honors

- 2024/03 PIERS Young Scientist Award
- 2023/12 Chief Scientist of National Key R&D (Young Scientist) Program of China
- 2022/12 Pengcheng Peacock Plan (Class B)
- 2022/10 NSFC Early-Career Award
- 2022/06 MIT Technology Review Top 35 Innovators Under 35 (TR35, Global List)
- 2018/11 National Excellent Doctoral Dissertation in the Field of Measurement, Control and Instrument by China Instrument and Control Society (ranking 1st)
- 2018/07 Excellent Doctoral Dissertation of Tsinghua University
- 2016/10 The Hainengchizi Scholarship for outstanding graduate students
- 2011/12 Prize for Excellence in Tsinghua University Electronic Design Contest
- 2011/11 The Hongqian Electronics Scholarship for outstanding academic performance
- 2010/11 The Huangqianheng Scholarship for outstanding academic performance
- 2010/06 Third Prize in Beijing Mechanical Innovation Design Competition

## Professional Activities

- Member of CSMNT, CIS, IEEE, Optica, MRS, APS
- Independent Reviewer of International Journals (17): *Nature Photonics*, *Joule*, *Nature Communications*, *Advanced Materials*, *Advanced Functional Materials*, *Small*, *APL Photonics*, *IEEE Transactions on Electron Devices*, *Advanced Materials Technologies*, *ACS Applied Electronic Materials*, *Advanced Electronic Materials*, *Scientific Reports*, *Applied Physics Letters*, *Optics Letters*, *Advanced Intelligent Systems*, *Physica Status Solidi B: Basic Solid State Physics*, *iScience*.

## Graduates and undergraduates supervised

- Graduates: (Current) Xuzhe Zhao, Chunjiang Li, Shujie Yang, Qiyue Chen.
- Undergraduates: (Current) Xinxiang Ye, Zhiyun Wang, Jiahao Cheng; (Past) Jiachen Li, Yiwen Wang, Tiancheng Zhang, Daniel Cui, Derick Tseng.

## Community Service

- 2023/07 Lecturer for high-school students at Shenzhen X-Institute
- 2020/03 Referee at Alameda County Science and Engineering Fair (ACSEF)

## Publications (\*co-first author, #corresponding author)

1. J. Li\*, K. Dong\*, T. Zhang, D. Tseng, C. Fang, R. Guo, J. Li, Y. Xu, C. Dun, J. J. Urban, T. Hong, C. P. Grigoropoulos, A. Javey, J. Yao, and J. Wu. Printable, emissivity-adaptive and albedo-optimized covering for year-round energy saving. *Joule*, 7, 1-16 (2023).
2. T. Zhang\*, K. Dong\*, #, J. Li, F. Meng, J. Li, S. Munagavalasa, C. P. Grigoropoulos, J. Wu, and J. Yao#. Twisted Moiré Photonic Crystal Enabled Optical Vortex Generation through Bound States in the Continuum. *Nature Communications*, 14, 6014 (2023).
3. J. Li and K. Dong#. Scalable and Durable Temperature-stabilizing Janus Thermal Cloak. *Joule*, 7, 1399-1414 (2023).
4. K. Dong and J. Wu. Radiative Cooling, What's Next? *Next Energy*, 1, 100003 (2023).
5. K. Dong\*, #, J. Li\*, T. Zhang, F. Gu, Y. Cai, N. Gupta, K. Tang, A. Javey, J. Yao, and J. Wu#. Single-Pixel Reconstructive Mid-Infrared Micro-Spectrometer. *Optics Express*, 9, 14367-14376 (2023).
6. K. Dong, D. Tseng, J. Li, S. Warkander, J. Yao, and J. Wu. Reducing Temperature Swing of Space Objects with Temperature-Adaptive Solar or Radiative Coating. *Cell Reports Physical Science*, 3, 101066 (2022).
7. H. Zhang\*, D. Raftery\*, Y. Chan\*, Y. Shao\*, R. Chen, X. Chen, X. Huang, J. T. Reichenadter, K. Dong, S. Susarla, L. Caretta, Z. Chen, J. Yao, P. Fischer, J. B. Neaton, W. Wu, D. A. Muller, R. J. Birgeneau, and R. Ramesh. Room-temperature skyrmion lattice in a layered magnet (Fe<sub>0.5</sub>Co<sub>0.5</sub>)<sub>5</sub>GeTe<sub>2</sub>. *Science Advances*, 8, abm7103 (2022).
8. D. Wang, K. Dong, J. Li, C. Grigoropoulos, J. Yao, J. Hong, and J. Wu. Low-loss, geometry-invariant optical waveguides with near-zero-index materials. *Nanophotonics*, 11, 4747-4753 (2022).

9. K. Tang\*, K. Dong\*, J. Li\*, M. P. Gordon, F. G. Reichertz, H. Kim, Y. Rho, Q. Wang, C.-Y. Lin, C. P. Grigoropoulos, A. Javey, J. J. Urban, J. Yao, R. Levinson, and J. Wu. Temperature Adaptive Radiative Coating for All-Season Household Thermal Regulation, **Science**, 374, 1504-1509 (2021).
  - *Highlighted internationally in more than 70 news media, including Ministry of Science and Technology of the People's Republic of China, Chinese Academy of Sciences, Xinhua Net, China Daily, People's Daily Online, United Press International, EurekAlert!, Popular Science, Physics Today, Lawrence Berkeley National Laboratory News, California News Times, ABC7 News, etc.*
10. K. Dong\*, T. Zhang\*, J. Li, Q. Wang, F. Yang, Y. Rho, D. Wang, C. P. Grigoropoulos, J. Wu, and J. Yao. Flat Bands in Magic-Angle Bilayer Photonic Crystals at Small Twists, **Physical Review Letters**, 126, 2223601 (2021).
  - *Selected as "Editors' suggestion" in Physical Review Letters.*
  - *Highlighted by the department of Materials Science and Engineering at U.C. Berkeley.*
11. K. Tang\*, K. Dong\*, C. J. Nicolai, Y. Li, J. Li, S. Lou, C.-W. Qiu, D. H. Rault, J. Yao, and J. Wu. Millikelvin-resolved Ambient Thermography, **Science Advances**, 6, eabd8688 (2020).
  - *Highlighted in the magazine of Berkeley Engineering as the cover story.*
12. G. Xu, K. Dong, Y. Li, H. Li, K. Liu, L. Li, J. Wu, and C.-W. Qiu. Tunable Analog Thermal Material, **Nature Communications**, 11, 6028 (2020).
13. K. Tang, X. Wang, K. Dong, Y. Li, J. Li, B. Sun, X. Zhang, C. Dames, C. Qiu, J. Yao, and J. Wu, Thermal Radiation Beyond the Stefan-Boltzmann Law by Emissivity Engineering with Graded Metal-insulator Transition, **Advanced Materials**, 32, 1907071 (2020).
  - *Highlighted by the School of Engineering at U.C. Berkeley and Materials Views China.*
14. Y. Deng\*, X. Wang\*, Z. Gong\*, K. Dong, S. Lou, N. Pégard, K. B. Tom, F. Yang, Z. You, L. Waller, and J. Yao. All-Silicon Broadband Ultraviolet Metasurfaces, **Advanced Materials**, 30, 1802632 (2020).
15. K. Dong\*, S. Hong\*, Y. Deng\*, H. Ma, J. Li, X. Wang, J. Yeo, L. Wang, S. Lou, K. B. Tom, K. Liu, Z. You, Y. Wei, C. P. Grigoropoulos, J. Yao, and J. Wu. A Lithography-Free and Field-Programmable Photonic Metacanvas, **Advanced Materials**, 30, 1703878 (2018).
  - *Highlighted in Journal inside back cover.*
  - *Highlighted by the School of Engineering and the department of Materials Science and Engineering at U.C. Berkeley, Nanowerk, Chinese Society of Micro-Nano Technology, Tsinghua University, Research & Development Affairs Office and the department of Precision Instrument at Tsinghua University.*
  - *Introduced in the book of "Nanoengineering: The Skills and Tools Making Technology Invisible".*
16. X. Wang\*, K. Dong\*, H. S. Choe, H. Liu, S. Lou, K. B. Tom, H. A. Bechtel, Z. You, J. Wu, and J. Yao. Multifunctional Microelectro-Opto-Mechanical Platform Based on Phase-Transition Materials, **Nano Letters**, 18, 1637-1643 (2018).
17. K. Dong, H. S. Choe, X. Wang, H. Liu, B. Saha, C. Ko, Y. Deng, K. B. Tom, S. Lou, L. Wang, C. P. Grigoropoulos, Z. You, J. Yao, and J. Wu. A 0.2 V Micro-Electromechanical Switch Enabled by a Phase Transition, **Small**, 14, 1703621 (2018).
  - *Highlighted in Journal cover.*
18. K. Dong\*, Y. Deng\*, X. Wang, K. B. Tom, Z. You, and J. Yao. Subwavelength Light Confinement and Enhancement Enabled by Dissipative Dielectric Nanostructures, **Optics Letters**, 43, 1826-1829 (2018).
19. K. Dong, S. Lou, J. Yao, J. Wu, and Z. You. Measurement of Residual Stresses in Pulsed Laser Deposited Thin Films. **Optics and Precision Engineering**, 26, 70-76 (2018).
20. H. S. Choe, J. Suh, C. Ko, K. Dong, S. Lee, J. Park, Y. Lee, K. Wang, and J. Wu. Enhancing Modulation of Thermal Conduction in Vanadium Dioxide Thin Film by Nanostructured Nanogaps, **Scientific Reports**, 7, 7131 (2017).
21. K. Dong#, S. Lou, H. S. Choe, K. Liu, Z. You, J. Yao, and J. Wu. Stress Compensation for Arbitrary Curvature Control in Vanadium Dioxide Phase Transition Actuators, **Applied Physics Letters**, 109, 023504 (2016).
22. J. Hou, X. Wang, D. Fu, C. Ko, Y. Chen, Y. Sun, S. Lee, K. X. Wang, K. Dong, Y. Sun, S. Tongay, L. Jiao, J. Yao, K. Liu, and J. Wu. Modulating Photoluminescence of Monolayer Molybdenum Disulfide by Metal-Insulator Phase Transition in Active Substrates, **Small**, 12, 3976-3984 (2016).
23. X. Wang, Z. Gong, K. Dong, S. Lou, J. Slack, A. Anders, and J. Yao. Tunable Bragg Filters with a Phase

Transition Material Defect Layer, *Optics Express*, 24, 20365-20372 (2016).

24. W. Fan, X. Zhu, F. Ke, Y. Chen, K. Dong, J. Ji, B. Chen, S. Tongay, J. W. Ager, K. Liu, H. Su, and J. Wu. Vibrational Spectrum Renormalization by Enforced Coupling Across the Van der Waals Gap between MoS<sub>2</sub> and WS<sub>2</sub> Monolayers, *Physical Review B*, 92, 241408 (2015).

### **(Provisional) Patents and Invention Disclosures**

1. J. Wu, J. Li, and K. Dong. Scalable Temperature Adaptive Radiative Coating with Optimized Solar Absorption, 2022 (provisional).
2. J. Wu, K. Tang, K. Dong, and J. Li. Temperature-Adaptive Radiative Coating for All-Season Household Thermal Regulation, 2021 (provisional).
3. J. Wu, K. Tang, and K. Dong. Surface Sensitization for High-Resolution Thermal Imaging, 2021 (provisional).
4. Z. You, K. Dong, J. Wu, and J. Yao, Phase-Change Micro-Mechanic Switches Based on Vanadium Dioxide, 2017.
5. J. Wu, J. Yao, and K. Dong. Lithography-Free and Field-Programmable Photonic Meta-Canvases, 2017 (provisional).

### **Conferences**

1. K. Dong, J. Li, K. Tang, and T. Zhang. Zero-power Smart Thermal Management by Temperature-adaptive Radiative Coatings. *25th Annual Conference of the Chinese Society of Micro-Nano Technology & 14th International conference of the Chinese Society of Micro-Nano Technology*, Shenzhen, 2023.
2. J. Wu, J. Li, K. Dong, D. Tseng, and K. Xu. Temperature Adaptive Solar and Radiative Coating for Thermal Management of Terrestrial and Space Objects, *Materials Research Society (MRS) spring meeting*, 2023.
3. J. Wu, J. Li, T. Zhang, K. Dong, and J. Yao. Programmable Photonics with Metal Insulator Transition, *Materials Research Society (MRS) spring meeting*, 2023.
4. K. Dong, T. Zhang, J. Li, Q. Wang, F. Yang, Y. Rho, D. Wang, C. P. Grigoropoulos, J. Wu, and J. Yao. Magic-Angle Flat Bands and Light Localization in Bilayer Honeycomb Photonic Crystals with A Small Twist, *Materials Research Society (MRS) spring meeting*, 2022.
5. J. Li, K. Tang, K. Dong, M. P. Gordon, F. G. Reichertz, H. Kim, Y. Rho, Q. Wang, C.-Y. Lin, C. P. Grigoropoulos, A. Javey, J. J. Urban, J. Yao, R. Levinson, and J. Wu. Self-Adaptive Radiative Cooler for Maximizing Year-Round Energy Saving of Households, *Conference on Lasers and Electro-Optics (CLEO)*, 2022.
6. K. Tang, K. Dong, J. Li, M. P. Gordon, F. G. Reichertz, H. Kim, Y. Rho, Q. Wang, C.-Y. Lin, C. P. Grigoropoulos, A. Javey, J. J. Urban, J. Yao, R. Levinson, and J. Wu. Temperature-adaptive Radiative Coating for All-Season Household Thermal Regulation by VO<sub>2</sub> Based Metamaterials, *Photonics and Electromagnetics Research Symposium (PIERS)*, 2022.
7. Y. Deng, X. Wang, Z. Gong, K. Dong, S. Lou, N. Pégard, K. B. Tom, F. Yang, Z. You, L. Waller, and J. Yao. Ultraviolet Metasurface Based on Highly Scattering Silicon Antennas. *SPIE Photonics West*, 2019.
8. X. Wang, K. Dong, H. S. Choe, H. Liu, S. Lou, K. B. Tom, H. A. Bechtel, Z. You, J. Wu, and J. Yao. A Multifunctional Micro-Electro-Opto-Mechanical (MEOM) Platform Based on Phase-transition Materials, *Conference on Lasers and Electro-Optics (CLEO)*, 2018.
9. K. Dong, S. Hong, Y. Deng, H. Ma, J. Li, X. Wang, J. Yeo, L. Wang, S. Lou, K. B. Tom, K. Liu, Z. You, Y. Wei, C. P. Grigoropoulos, J. Yao, and J. Wu. A Reprogrammable Photonic Meta-platform, *Conference on Lasers and Electro-Optics (CLEO)*, 2018.
10. X. Wang, Z. Gong, K. Dong, S. Lou, J. Slack, A. Anders, and J. Yao. All-solid-state Tunable Bragg filters Based on A Phase Transition Material, *Conference on Lasers and Electro-Optics (CLEO)*, 2017.

### **Invited/Keynote Talks and Seminars**

1. K. Dong. "What One Single Material Can Do? Smart Micromechanical and Nanophotonic Devices Based on the Phase-Change Material of Vanadium Dioxide", Department of Materials Science and Engineering, Southern University of Science and Technology, 2023/12/08. Host: Prof. Chun Cheng.

2. K. Dong. "What One Single Material Can Do? Smart Micromechanical and Nanophotonic Devices Based on the Phase-Change Material of Vanadium Dioxide", School of Mechanical Engineering, Shanghai Jiao Tong University, 2023/11/29. Host: Prof. Jing Wang. (Virtual broadcast by Research Cloud)
3. K. Dong. "What One Single Material Can Do? Smart Micromechanical and Nanophotonic Devices Based on the Phase-Change Material of Vanadium Dioxide", Tsinghua-Berkeley Shenzhen Institute, Tsinghua Shenzhen International Graduate School, Tsinghua University, 2023/11/28. Host: Prof. Xuan Zhang.
4. K. Dong. Opening Assembly Address. Tsinghua-Berkeley Shenzhen Institute (TBSI), Tsinghua Shenzhen International Graduate School, Tsinghua University, 2023/09/12.
5. K. Dong. Opening Assembly Address, Institute of Data and Information (IDI), Tsinghua Shenzhen International Graduate School, Tsinghua University, 2023/09/09.
6. K. Dong. "Zero-power Smart Micro-devices Based on the Phase-change Material of Vanadium Dioxide", Guanggu Forum, The Chinese Optical Society Academic Conference, Wuhan, China, 2023/07/31 (Invited).
7. K. Dong. "MEMS Switches and Infrared Smart Flexible Membrane Technologies Based on Vanadium Dioxide", Academic Workshop, Smart Microsystem Group, Tsinghua University, 2023/04/29 (Keynote).
8. K. Dong. "Endowing Radiative Cooling Materials with Intelligence", Institute of Data and Information, Tsinghua Shenzhen International Graduate School, Tsinghua University, 2023/02/25 (Keynote).
9. K. Dong. "Passive temperature-adaptive flexible membranes based on vanadium dioxide", School of Materials Science and Engineering, Sichuan University, 2023/02/21. Host: Prof. Qiwu Shi.
10. K. Dong. "Endowing Radiative Cooling Materials with Intelligence", World Science and Technology Youth Forum, Hangzhou, China, 2022/11/14 (Virtual).
11. K. Dong. "The Most Common Artwork", Lecture Series Celebrating the 10-Year Anniversary of the Department of Precision Instrument, Tsinghua University, 2022/07/22 (Keynote/Opening/Virtual). Host: Prof. Lei Deng.
12. K. Dong. "Smart radiative cooling for all-season household thermal regulation". Department of Precision Instrument, Tsinghua University, Doctoral Academic Forum, 2022/06/12 (Keynote/Virtual).
13. K. Dong. "Smart radiative cooling for all-season household thermal regulation", MSE Seminar at U.C. Berkeley, 2022/04/07. Host: Prof. Zakaria Al Balushi.
14. K. Dong. "Smart radiative cooling for all-season household thermal regulation", Engineering and Applied Science Forum, 2022/03/13 (Virtual). Host: Prof. Jing Wang.