

## DANFENG LI

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### ACADEMIC QUALIFICATIONS

- Ph.D. in Physics, University of Geneva, 2016  
Advisor: Prof. Jean-Marc Triscone  
Dissertation: *Electronic Properties of the LaAlO<sub>3</sub>-SrTiO<sub>3</sub> Interfaces and Related Heterostructures*
- M.Phil. in Applied Physics, The Hong Kong Polytechnic University, 2011  
Advisor: Prof. Ji-yan Dai  
Thesis: *Pulsed-laser Deposition of Perovskite Polar Oxide Films on SrTiO<sub>3</sub> and Study of Interfacial Transport Properties*
- B.Eng. in Materials Science and Engineering, Zhejiang University, 2008

### PRESENT & PAST ACADEMIC POSITIONS

City University of Hong Kong	Assistant Professor	(11.2020 – Present)
Stanford University	Postdoctoral Fellow (Advisor: Harold Hwang)	(02.2017 – 10.2020)
University of Geneva	Postdoctoral Scholar (Advisor: Jean-Marc Triscone)	(11.2016 – 01.2017)
University of Geneva	Graduate Research Assistant (Advisor: Jean-Marc Triscone)	(04.2011 – 10.2016)
The Hong Kong Polytechnic University	Research Assistant (Advisor: Ji-yan Dai)	(09.2010 – 01.2011)

### PREVIOUS RELEVANT RESEARCH WORK

Condensed-matter physics and materials science: Low-dimensional superconductivity; Pulsed-laser deposition; Cuprate/nickelate superconductors; Atomic-scale fabrication of oxide heterostructures and nanomembranes; Oxide interfaces physics; Synthesis of unconventional quantum materials; Novel superconductors by design.

### PRIZES & AWARDS

- MIT Technology Review 35 Innovators Under 35, *MIT TR35 China* (2021)
- Finalist of “Falling Walls”, *“Falling Walls” Foundation* (2020)
- Early Postdoc.Mobility Fellowship, *Swiss National Science Foundation* (2016)
- Chinese Government Award for Outstanding Self-Financed Chinese Students Abroad, *Chinese Scholarship Council* (2015)
- Finalist of the 10th “Chuihui Cup” *Innovation and Entrepreneurship Competition* (2015)
- Distinguished Graduate from *Zhejiang University* (2008)

## PROFESSIONAL ACTIVITIES

- Member of American Physical Society, Materials Research Society, American Chemical Society
- Guest Editor to *Frontiers in Physics*, “Advances in Superconducting Infinite-Layer and Related Nickelates”

## PUBLICATION RECORDS

\*Corresponding author

1. Z. Dong, H. Chen, M. Qi, J. Shen, W. Liu, E.-J. Guo, **D. Li**, Y. Zhang, and Z. P. Wu, Enhanced upconversion photoluminescence assisted by flexoelectric field in oxide nanomembranes, *Laser & Photonics Reviews* **16**, 2100454 (2022).
2. Y.-T. Hsu, M. Osada, B. Y. Wang, M. Berben, C. Duffy, S. P. Harvey, K. Lee, **D. Li**, S. Wiedmann, H. Y. Hwang, and N. E. Hussey, Correlated insulating behavior in infinite-layer nickelates, *Frontiers in Physics* **10**, 846639 (2022).
3. H. Zhu, Y. Tang, K. M. Wiaderek, O. J. Borkiewicz, Y. Ren, J. Zhang, J. Ren, L. Fan, C. C. Li, **D. Li**, X.-L. Wang, and Qi Liu\*, Spontaneous strain buffer enables superior cycling stability in single-crystal nickel-rich NCM cathode, *Nano Letters* **21**, 9997 (2021).
4. M. Osada, B. Y. Wang, B. H. Goodge, S. P. Harvey, K. Lee, **D. Li**, L. F. Kourkoutis, and H. Y. Hwang, Nickelate superconductivity without rare-earth magnetism: (La,Sr)NiO<sub>2</sub>, *Advanced Materials* **33**, 2104083 (2021).
5. Y. Hsu\*, B. Y. Wang, M. Berben, **D. Li**, K. Lee, C. Duffy, T. Ottenbros, W. J. Kim, M. Osada, S. Wiedmann, H. Y. Hwang\*, and N. E. Hussey\*, Insulator-to-metal crossover near the edge of the superconducting dome in Nd<sub>1-x</sub>Sr<sub>x</sub>NiO<sub>2</sub>, *Physical Review Research* **3**, L042015 (2021).
6. H. Lu, M. Rossi, A. Nag, M. Osada, **D. Li**, K. Lee, B. Y. Wang, M. Garcia-Fernandez, S. Agrestini, Z.-X. Shen, E. M. Been, B. Moritz, T. P. Devereaux, J. Zaanen, H. Y. Hwang, K.-J. Zhou\*, and W.-S. Lee\*, Magnetic excitations in infinite-layer nickelates, *Science* **373**, 213 (2021).
7. **D. Li\***, C. Adamo, B. Y. Wang, H. Yoon, Z. Y. Chen, S. S. Hong, D. Lu, Y. Cui, Y. Hikita, and H. Y. Hwang, Stabilization of Sr<sub>3</sub>Al<sub>2</sub>O<sub>6</sub> growth templates for ex situ synthesis of freestanding crystalline oxide membranes, *Nano Letters* **21**, 4454 (2021).
8. Z. P. Wu\*, M. Boselli, **D. Li\***, A. Fête, M. Gibert, M. Viret, and S. Gariglio, Large Tuning of Electroresistance in an electromagnetic device structure based on the ferromagnetic–piezoelectric interface, *ACS Applied Materials & Interfaces* **13**, 18984 (2021).
9. **D. Li\***, The discovery and research progress of the nickelate superconductors, *SCIENTIA SINICA Physica, Mechanica & Astronomica* **51**, 047405 (2021) (In Chinese). (李丹楓, 鎳氧化物超導體的發現與研究進展, 中國科學: 物理學 力學 天文學 **51**, 047405 (2021).)
10. B. Y. Wang\*, **D. Li**, B. H. Goodge, K. Lee, M. Osada, S. P. Harvey, L. F. Kourkoutis, M. R. Beasley, and H. Y. Hwang\*, Isotropic Pauli-limited superconductivity in the infinite layer nickelate Nd<sub>0.775</sub>Sr<sub>0.225</sub>NiO<sub>2</sub>, *Nature Physics* **17**, 473 (2021).
11. B. H. Goodge, **D. Li**, M. Osada, B. Y. Wang, K. Lee, G. A. Sawatzky, H. Y. Hwang, and L. F. Kourkoutis\*, Doping evolution of the Mott-Hubbard landscape in infinite-layer nickelates, *PNAS* **118**, e2007683118 (2021).
12. M. Osada\*, B. Y. Wang, K. Lee, **D. Li\***, and H. Y. Hwang\*, Phase diagram of infinite layer praseodymium nickelate Pr<sub>1-x</sub>Sr<sub>x</sub>NiO<sub>2</sub> thin films, *Physical Review Materials* **4**, 121801(R) (2020).

13. M. Osada\*, B. Y. Wang, B. H. Goodge, K. Lee, H. Yoon, K. Sakuma, **D. Li**, M. Miura, L. F. Kourkoutis, and H. Y. Hwang\*, A superconducting praseodymium nickelate with infinite layer structure, *Nano Letters* **20**, 5735 (2020).
14. **D. Li**\*, B. Y. Wang\*, K. Lee, S. P. Harvey, M. Osada, B. H. Goodge, L. F. Kourkoutis, and H. Y. Hwang\*, Superconducting dome in  $\text{Nd}_{1-x}\text{Sr}_x\text{NiO}_2$  infinite layer films, *Physical Review Letters* **125**, 027001 (2020).
15. F. Zhang, Y.-W. Fang, N. Y. Chan, W. C. Lo, **D. Li**, C.-G. Duan, F. Ding, and J.-Y. Dai\*, Dynamic modulation of the transport properties of the  $\text{LaAlO}_3/\text{SrTiO}_3$  interface using uniaxial strain, *Physical Review B* **93**, 214427 (2016).
16. K. Lee\*, B. H. Goodge, **D. Li**\*, M. Osada, B. Y. Wang, Y. Cui, L. F. Kourkoutis, and H. Y. Hwang, Aspects of the synthesis of thin film superconducting infinite-layer nickelates, *APL Materials* **8**, 041107 (2020).
17. A. Gloter\*, G. Tieri, **D. Li**, M. Caputo, V. N. Strocov, O. Stephan, J.-M. Triscone, and S. Gariglio\*, Role of point and line defects on the electronic structure of  $\text{LaAlO}_3/\text{SrTiO}_3$  interfaces, *APL Materials* **8**, 041103 (2020).
18. M. Caputo, M. Boselli, A. Filippetti, S. Lemal, **D. Li**, A. Chikina, C. Cancellieri, T. Schmitt, J.-M. Triscone, Ph. Ghosez, S. Gariglio, and V. N. Strocov\*, Artificial quantum confinement in  $\text{LaAlO}_3/\text{SrTiO}_3$  heterostructures, *Physical Review Materials* **4**, 035001 (2020).
19. M. Hepting, **D. Li**, C. J. Jia\*, H. Lu, E. Paris, Y. Tseng, X. Feng, M. Osada, E. Been, Y. Hikita, Y.-D. Chuang, Z. Hussain, K. J. Zhou, A. Nag, M. Garcia-Fernandez, M. Rossi, H. Y. Huang, D. J. Huang, Z. X. Shen, T. Schmitt, H. Y. Hwang, B. Moritz, J. Zaanen, T. P. Devereaux, and W. S. Lee\*, Electronic structure of the parent compound of superconducting infinite-layer nickelates, *Nature Materials* **19**, 381 (2020).
20. **D. Li**\*, K. Lee, B. Y. Wang, M. Osada, S. Crossley, H.-R. Lee, Y. Cui, Y. Hikita, and H. Y. Hwang\*, Superconductivity in an infinite-layer nickelate, *Nature* **572**, 624 (2019).
21. Z. Chen\*, B. Y. Wang, B. H. Goodge, D. Lu, S. S. Hong, **D. Li**, L. F. Kourkoutis, Y. Hikita, and H. Y. Hwang\*, Freestanding crystalline  $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$  heterostructure membranes, *Physical Review Materials* **3**, 060801 (2019).
22. **D. Li**\*, S. Lemal, S. Gariglio, Z. Wu, A. Fête, M. Boselli, Ph. Ghosez, and J.-M. Triscone, Probing quantum confinement and electronic structure at polar oxide interfaces, *Advanced Science* **5**, 1800242 (2018).
23. I. Pallecchi, F. Telesio, D. Marré\*, **D. Li**, S. Gariglio, J.-M. Triscone, and A. Filippetti\*, Large phonon-drag enhancement induced by narrow quantum confinement at the  $\text{LaAlO}_3/\text{SrTiO}_3$  interface, *Physical Review B* **93**, 195309 (2016).
24. M. Boselli\*, **D. Li**, W. Liu, A. Fête, S. Gariglio, and J.-M. Triscone, Characterization of atomic force microscopy written conducting nanowires at  $\text{LaAlO}_3/\text{SrTiO}_3$  interfaces, *Applied Physics Letters* **108**, 061604 (2016).
25. W. Liu\*, S. Gariglio, A. Fête, **D. Li**, M. Boselli, D. Stornaiuolo, and J.-M. Triscone, Magneto-transport study of top-and back-gated  $\text{LaAlO}_3/\text{SrTiO}_3$  heterostructures, *APL Materials* **3**, 062805 (2015).
26. I. Pallecchi, F. Telesio, **D. Li**, A. Fête, S. Gariglio, J.-M. Triscone, A. Filippetti, P. Delugas, V. Fiorentini, and D. Marré\*, Giant oscillating thermopower at oxide interfaces, *Nature Communications* **6**, 6678 (2015).
27. A. Fête\*, C. Cancellieri, **D. Li**, D. Stornaiuolo, A. D. Caviglia, S. Gariglio, and J.-M. Triscone, Growth-induced electron mobility enhancement at the  $\text{LaAlO}_3/\text{SrTiO}_3$  interface, *Applied Physics Letters* **106**, 051604 (2015).
28. D. Stornaiuolo\*, S. Gariglio, A. Fête, M. Gabay, **D. Li**, D. Massarotti, and J.-M. Triscone, Weak localization and spin-orbit interaction in side-gate field effect devices at the  $\text{LaAlO}_3/\text{SrTiO}_3$  interface, *Physical Review B* **90**, 235426 (2014).

29. A. Fête\*, S. Gariglio, C. Berthod, **D. Li**, D. Stornaiuolo, M. Gabay, and J.-M. Triscone, Large modulation of the Shubnikov-de Haas oscillations by the Rashba interaction at the LaAlO<sub>3</sub>/SrTiO<sub>3</sub> interface, *New Journal of Physics* **16**, 112002 (2014).
30. S. Gariglio\*, A. Fête, D. Stornaiuolo, **D. Li**, M. Gabay, and J.-M. Triscone, Analysis of low temperature magnetoresistance of LaAlO<sub>3</sub>/SrTiO<sub>3</sub> interfaces, *Proc. SPIE* **8987**, 898711 (2014).
31. **D. Li**\*, S. Gariglio, C. Cancellieri, A. Fête, D. Stornaiuolo, and J.-M. Triscone, Fabricating superconducting interfaces between artificially grown LaAlO<sub>3</sub> and SrTiO<sub>3</sub> thin films, *APL Materials* **2**, 012102 (2014).
32. A. Filippetti, P. Delugas, M. J. Verstraete, I. Pallecchi, A. Gadaleta, D. Marré, **D. Li**, S. Gariglio, and V. Fiorentini, Thermopower in oxide heterostructures: the importance of being multiple-band conductors, *Physical Review B* **86**, 195301 (2012).
33. M.-L. Reinle-Schmitt, C. Cancellieri, **D. Li**, D. Fontaine, M. Medarde, E. Pomjakushina, C. W. Schneider, S. Gariglio, Ph. Ghosez, J.-M. Triscone, and P. R. Willmott\*, Tunable conductivity threshold at polar oxide interfaces, *Nature Communications* **3**, 932 (2012).
34. K. Au, **D. Li**, N.-Y. Chan, and J.-Y. Dai\*, Polar liquid molecule induced transport property modulation at LaAlO<sub>3</sub>/SrTiO<sub>3</sub> heterointerface, *Advanced Materials* **24**, 2598 (2012).
35. **D. Li**, Y. Wang, and J.-Y. Dai\*, Tunable electronic transport properties of DyScO<sub>3</sub>/SrTiO<sub>3</sub> polar heterointerface, *Applied Physics Letters* **98**, 122108 (2011).
36. K.-C. Chan, P.-F. Lee, **D. Li**, and J.-Y. Dai\*, Memory characteristics and the tunneling mechanism of Au nanocrystals embedded in a DyScO<sub>3</sub> high-*k* gate dielectric layer, *Semiconductor Science and Technology* **26**, 025015 (2011).
37. Y. Wang, **D. Li**, and J.-Y. Dai\*, Microstructure and magnetic properties of a novel spinel (Zn, Co)Fe<sub>2</sub>O<sub>4</sub> thin film on the SrTiO<sub>3</sub> substrate, *Journal of Crystal Growth* **313**, 26 (2010).
38. H. Miao, M. Gao, **D. Li**, F. Xu, Y. Lin, K. Zhong, and H. Pan\*, Effects of Boron Addition on Structural and Electrochemical Properties of La-Mg-Ni-Co System Hydrogen Storage Electrode Alloys, *Rare Metal Materials and Engineering* **38**, 193 (2009).
39. H. Miao, Y. Liu, **D. Li**, F. Xu, K. Luo, Y. Zhao, M. Gao, and H. Pan\*, Electrochemical properties of Ti<sub>0.8</sub>Zr<sub>0.2</sub>V<sub>2.7</sub>Mn<sub>0.5</sub>Cr<sub>0.8</sub>Ni<sub>1.25</sub> hydrogen storage alloy electrodes with various Ni powder fractions, *Physica Scripta* **2007**, 99 (2007).

## INVITED SEMINARS

- *Soft-Chemistry Approaches to Superconductivity in Infinite-Layer Nickelates*, The Hong Kong Institute for Advanced Study (HKIAS) Rising Star Lecture - Physics, October 2022.
- *Synthesis and Electronic Structure of Nickelate Superconductors*, School of Physics, Zhengzhou University, July 2021.
- *Synthesis and Electronic Structure of Nickelate Superconductors*, Max-Planck Institute – Hamburg (online), March 2021.
- *Synthesis and Electronic Structure of Nickelate Superconductors*, Monash University – FLEET Center (online), February 2021.
- *Synthesis and Electronic Structure of Nickelate Superconductors*, Institute of Physics, CAS (online), July 2020.
- *Synthesis and Electronic Structure of Nickelate Superconductors*, PNNL (online), June 2020.
- *'Unconventional' Superconductivity in Oxide Quantum Materials and Heterostructures*, Department of Physics, Tsinghua University, China, 08 June 2020.
- *'Unconventional' Superconductivity in Oxide Quantum Materials and Heterostructure*, Department of Physics, City University of Hong Kong, Hong Kong, China, 01 June 2020.

- *'Unconventional' Superconductivity in Oxide Quantum Materials and Heterostructure*, School of Physical Science and Technology, ShanghaiTech University, China, 29 May 2020.
- *Topochemistry Approaches to Nickelate Superconductors*, MSE Colloquium, Department of Materials Science and Engineering, Stanford University, USA, 08 May 2020.
- *Synthesis and Electronic Structure of Nickelate Superconductors*, Department of Physics, Tsinghua University, China, 24 April 2020.
- *Topochemistry Approach to Nickelate Superconductors*, School of Materials Science and Engineering, Tsinghua University, China, 21 April 2020.
- *Synthesis and Electronic Structure of Nickelate Superconductors*, SLAC National Accelerator Laboratory, Menlo Park, California, USA, 24 February 2020.
- *2-D Superconductivity at the LaAlO<sub>3</sub>/SrTiO<sub>3</sub> interface*, Department of Applied Physics, The Hong Kong Polytechnic University, Hong Kong, China, 29 May 2015.
- *2-D Superconductivity at the LaAlO<sub>3</sub>/SrTiO<sub>3</sub> interface*, Department of Physics, Tsinghua University, Beijing, China, 05 January 2015.

## ORAL PRESENTATIONS

- *Superconductivity in infinite-layer nickelates*, The 1<sup>st</sup> Exotic Quantum Effects in Complex Materials, City University of Hong Kong, June 2022.
- *Superconductivity in Infinite Layer Nickelates without Rare-Earth Magnetism*, The 3<sup>rd</sup> Quantum Materials Workshop, Tsung-Dao Lee Institute, Shanghai, China (Online), August 2021.
- *Superconductivity in Infinite Layer Nickelates without Rare-Earth Magnetism*, IWSIQM, Beijing, China, June 2021.
- *Superconductivity and Electronic Structure of Infinite Layer Nickelates*, CMQM, Online, June 2021.
- *Superconductivity in Infinite Layer Nickelates*, Physics Symposium, City University of Hong Kong (online), June 2021.
- *Superconductivity and Electronic Structure of Infinite Layer Nickelates*, ICAM-China, Online, April 2021.
- *Superconducting Dome and Electronic Structure of the Nickelate Superconductors*, APS March Meeting, Online, March 2021.
- *Superconductivity and Electronic Structure of Infinite Layer Nickelates*, QUOROM-3, Online, February 2021.
- *无限层镍氧化物超导体的制备与电子特性*, 氧化物薄膜材料青年论坛, Online, January 2021.
- *Superconductivity in an Infinite-Layer Nickelate*, Materials Research Society (MRS) Fall Meeting, Boston, USA, 01 - 05 December 2019.
- *Superconductivity and Electronic Structure in Infinite-Layer Nickelates*, 26th International Workshop on Oxide Electronics (iWOE-26), Kyoto, Japan, 29 September - 02 October 2019.
- *Synthesis and Electronic Configuration of Infinite-Layer Nickelate Thin Films*, Materials Research Society (MRS) Spring Meeting, Phoenix, USA, 22 - 26 April 2019.
- *2-D Superconductivity at the LaAlO<sub>3</sub>/SrTiO<sub>3</sub> interface*, Ushimado International Workshop on Physics and Chemistry of Novel Superconductors and Related Materials, Ushimado, Japan, 08 - 10 November 2014.
- *2-D Superconductivity at the LaAlO<sub>3</sub>/SrTiO<sub>3</sub> interface*, Materials Research Society (MRS) Spring Meeting, San Francisco, USA, 21 - 25 April 2014.

- *Metal-Insulator Transitions in Freestanding NdNiO<sub>3</sub> Membranes*, American Physical Society (APS) March Meeting, Los Angeles, USA, 04 - 08 March 2018.
- *Metal-Insulator Transitions in Freestanding NdNiO<sub>3</sub> Membranes*, 24th International Workshop on Oxide Electronics (iWOE-24), Chicago, USA, 24 - 27 September 2017.
- *Intrinsic Electronic Confinement at Conducting Oxide Interfaces*, 23rd International Workshop on Oxide Electronics (iWOE-23), Nanjing, China, 11 - 14 October 2016.
- *Intrinsic Electronic Confinement at Conducting Oxide Interfaces*, American Physical Society (APS) March Meeting, Baltimore, USA, 14 - 18 March 2016.
- *Superconducting coupling properties of bi-interface LaAlO<sub>3</sub>/SrTiO<sub>3</sub> heterostructures*, The 11th International Conference on Materials & Mechanisms of Superconductivity, Geneva, Switzerland, 23 - 28 August 2015.
- *Superconducting interfaces between LaAlO<sub>3</sub> and SrTiO<sub>3</sub> thin films*, Materials Research Society (MRS) Fall Meeting, Boston, USA, 30 November - 05 December 2014.
- *Superconducting properties of two coupled LaAlO<sub>3</sub>/SrTiO<sub>3</sub> interfaces*, 21st International Workshop on Oxide Electronics (iWOE-21), Bolton Landing, USA, 28 September - 01 October 2014.
- *Superconducting interfaces between artificially-grown LaAlO<sub>3</sub> and SrTiO<sub>3</sub> thin films*, International Conference on Strongly Correlated Electron Systems, Grenoble, France, 07 - 11 July 2014.
- *Superconducting interfaces between artificially-grown LaAlO<sub>3</sub> and SrTiO<sub>3</sub> thin films*, American Physical Society (APS) March Meeting, Denver, USA, 03 - 07 March 2014.
- *Tunable conductivity threshold at polar oxide interfaces: implications for understanding its origin*, 4th International Oxides Workshop, Santander, Spain, 30 May - 01 June 2012.
- *Tuning electron mobility at LaAlO<sub>3</sub>/SrTiO<sub>3</sub> interfaces*, 3rd International Oxides Workshop, Olbia, Italy, 24 - 28 May 2011.

## **MEDIA PUBLICITY**

[Physics](#): Michael R. Norman, Entering the nickel age of superconductivity, *Physics* **13**, 85 (2020)

[Physics Today](#): (Top 10 most popular articles of 2019) R. Mark Wilson, Superconductivity is found in a nickel oxide, *Physics Today* **72**, 11, 19 (2019).

[Phys.org](#): First report of superconductivity in a nickel oxide material (2019).