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Prof. Jan-Chi Yang received his PhD degree from National Chiao Tung University, Taiwan, in 2014. During his PhD career, he has learned skills and expertise to process and characterize complex oxide materials. Over the past years, he focused on the growth and creation of functional materials, interfaces, heterostructures, nanostructures and free-standing matters via laser-MBE techniques, and recently he's trying to use the synchrotron-based and transport techniques to reveal the answers to the charming physics in quantum material systems. His main goal is to strike an elegant balance between materials science and physics for creating quantum materials with new functionalities and for unveiling the intriguing interplays beneath. His papers have been published in *Nature Mater.*, *Nature Commun.*, *Phys. Rev. Lett.*, *Advanced Mater.*, *ACS Nano*, *Nano Letters*, *PRB*, and so on. He has extensive experience in the use of advanced characterization techniques to understand and to manipulate complex oxides and strongly correlated systems. His expertise also includes the processing and the characterization via advanced electronic devices. The current goal of him is to use advanced growth and synchrotron-based techniques to understand the free-standing complex oxides with natural periodicities and low-dimensionality, which enable us to reveal the fancy interplays between the charge, spin, orbital and lattice degree of freedoms.

### **Research Expertise and Interests**

- Complex oxides
- Laser molecular beam epitaxy/ Pulsed laser deposition
- X-ray absorption spectroscopy/ Synchrotron radiation
- Thin film fabrication and devices
- Novel oxide nanoelectronics
- Fabrication and characterization of functional materials
- Multifunctional heterostructures, interfaces, and mesocrystals
- Fabrication and characterization of advanced nanostructures and nanoparticles

## **Professional Preparation**

Aug 2019 ~ present

**Associate Professor**

Department of Physics, National Cheng Kung University, Tainan, Taiwan

Aug 2016 ~ July 2019

**Assistant Professor**

Department of Physics, National Cheng Kung University, Tainan, Taiwan

Sep 2015 ~ July 2016

**Postdoctoral Fellow**

Max Planck Institute for Chemical Physics of Solids, Dresden, 01187, Germany

Principal investigator: Prof. Liu-Hao Tjeng

Aug 2014 ~ Sep 2015

**Postdoctoral Fellow**

Institute of Physics, National Chiao Tung University, Hsinchu, 30010, Taiwan

Principal investigator: Prof. Ying-Hao Chu, Prof. Jiunn-Yuan Lin

July 2013 ~ July 2014

**Doctoral Scholar Fellow**

**Visiting Scholar**

Advanced Light Source, Lawrence Berkeley National Laboratory, CA, 94720  
USA

Principal investigator: Prof. Elke Arenholz

Aug 2009 ~ July 2014

**Ph. D.**

Department of Materials Science and Engineering, National Chiao Tung  
University, Hsinchu, 30010, Taiwan

**Advisor: Prof. Ying-Hao Chu**

Aug 2005 ~ July 2009

**B. Sc.**

Department of Materials Science and Engineering, National Chiao Tung  
University, Hsinchu, 30010, Taiwan

## **Academic Awards**

1. The 8th (2020) Outstanding Young Scholar Awards from Foundation for the Advancement of Outstanding Scholarship.
2. The 18th Y. Z. Hsu Scientific Paper Award (2020).
3. 2019 Taiwan Outstanding Young Physicist Award.
4. Ministry of Science and Technology (MOST) Young Scholar Fellowship.

## **Book Chapters**

1. **J. C. Yang**, R. Ramesh, and Y. H. Chu, “Multiferroic Thin Films”, Wiley Encyclopedia of Electrical and Electronics Engineering, 2014 (Published Online: 16 MAR 2015, DOI: 10.1002/047134608X.W8235).
2. **J. C. Yang**, and Y. H. Chu, “Handbook of Magnetism: Multiferroics”, Taiwan Associate for Magnetic Technology (in press).
3. 磁性科技與應用 · 師範大學出版 · 出版日期 / 2017/04/01。

## **Publications**

### **a) Journal Papers**

1. J. Seidel, P. Maksymovych, Y. Batra, A. Katan, S.-Y. Yang, Q. He, A. Baddorf, S. V. Kalinin, C.-H. Yang, **J. C. Yang**, Y. H. Chu, E. K. H. Salje, H. Wormeester, M. Salmeron, and R. Ramesh, “Domain Wall Conductivity in La-doped BiFeO<sub>3</sub>”, *Phys. Rev. Lett.* **105**, 197603 (2010).
2. Y. Y. Chu, Y. F. Liao, V. T. Tra, **J. C. Yang**, W. Z. Liu, J. Y. Lin, Y. H. Chu, J. H. Huang, J. Weinen, S. Agrestini, K. D. Tsuei, and D. J. Huang, “Distribution of Electronic Reconstruction at the n-type LaAlO<sub>3</sub>/SrTiO<sub>3</sub> Interface Revealed by Hard X-Ray Photoemission Spectroscopy”, *Appl. Phys. Lett.* **99**, 262101 (2011).
3. S. C. Liao, P. Y. Tsai, H. J. Liu, **J. C. Yang**, S. J. Lin, C. H. Lai, and Y. H. Chu, “Misorientation Control and Functionality Design of Nanopillars in Self-Assemble Perovskite-Spinel Hetero-epitaxial Nanostructures”, *ACS Nano* **5**, 4118 (2011).
4. Y. C. Chen, G. F. Wang, H. H. Tai, J. W. Chen, Y. C. Huang, and **J. C. Yang**, and Y. H. Chu, “Non Volatile Domain Nucleation and Growth in Multiferroic BiFeO<sub>3</sub> Films”, *Nanotechnology* **22**, 254030 (2011).
5. Y. P. Chiu, Y. T. Chen, B. C. Huang, M. C. Shih, **J. C. Yang**, Q. He, C. W. Liang, J. Seidel, Y. C. Chen, R. Ramesh, and Y. H. Chu, “Atomic Scale Evolution of Local Electronic Structure Across Multiferroic Domain Walls”, *Adv. Mater.* **23**, 1530 (2011).
6. **J. C. Yang**, Q. He, S. J. Suresha, C. Y. Kuo, C. Y. Peng, R. Haislmaier, M. A. Motyka, G. Sheng, C. Adamo, H. J. Lin, Z. Hu, L. Chang, L. H. Tjeng, E. Arenholz, N. J. Podraza, M. Bernhagan, R. Uecker, D. G. Schlom, V. Gopalan, L. Q. Chen, C. T. Chen, R. Ramesh, and Y. H. Chu, “Orthorhombic BiFeO<sub>3</sub>”, *Phys. Rev. Lett.* **109**, 247606 (2012).
7. Q. He, C. H. Yeh, **J. C. Yang**, G. Singh-Bhalla, C. W. Laing, P. W. Chiu, G. Catalan, L. W. Martin, Y. H. Chu, J. F. Scott, and R. Ramesh, “Magnetotransport at domain walls in BiFeO<sub>3</sub>”, *Phys. Rev. Lett.* **108**, 067203 (2012).
8. L. Y. Chen, **J. C. Yang**, C. W. Luo, C. W. Liang, K. H. Wu, J. Y. Lin, T. M. Uen, J. Y. Juang, Y. H. Chu, and T. Kobayashi, “Ultrafast photostriction in BiFeO<sub>3</sub> thin films”, *Appl. Phys. Lett.* **101**, 041902 (2012).
9. Y. S. Chen, H. Y. Guo, **J. C. Yang**, Y. H. Chu, W. F. Wu, and J. G. Lin, “Electron paramagnetic resonance probed oxygen deficiency in SrTiO<sub>3</sub> with different cap layers”, *J. Appl. Phys.* **112**, 123720 (2012).
10. J. Cheung, K. A. Bogle, H. Cheng, J. Sullaphen, C. Y. Kuo, Y. J. Chen, H. J. Lin, C. T. Chen, **J. C. Yang**, Y. H. Chu, and N. Valanoor, “Phase evolution of magnetite nanocrystals on

- oxide supports via template-free bismuth ferrite precursor approach”, *J. Appl. Phys.* **112**, 104321 (2012).
11. R. K. Vasudevan, A. N. Morozovska, E. A. Eliseev, J. Britson, **J. C. Yang**, Y. H. Chu, P. Maksymovych, L. Q. Chen, V. Nagarajan, and S. V. Kalinin, “Domain wall geometry controls conduction in ferroelectrics”, *Nano Lett.* **12**, 5524 (2012).
  12. E. Strelcov, Y. Kim, **J. C. Yang**, Y. H. Chu, P. Yu, X. Lu, S. Jesse, and S. V. Kalinin, “Role of measurement voltage on hysteresis loop shape in PFM”, *Appl. Phys. Lett.* **101**, 192902 (2012).
  13. B. C. Huang, Y. P. Chiu, P. C. Huang, W. C. Wang, V. T. Tra, **J. C. Yang**, Q. He, J. Y. Lin, C. S. Chang, and Y. H. Chu, “Mapping band alignment across complex oxide heterointerfaces”, *Phys. Rev. Lett.* **109**, 246807 (2012).
  14. Y. C. Chen, C. H. Ko, Y. C. Huang, **J. C. Yang**, and Y. H. Chu, “Domain relaxation dynamics in epitaxial BiFeO<sub>3</sub> films: Role of surface charges”, *J. Appl. Phys.* **111**, 052017 (2012).
  15. B. C. Huang, Y. T. Chen, Y. P. Chiu, Y. C. Huang, **J. C. Yang**, Y. C. Chen, and Y. H. Chu, “Direct observation of ferroelectric polarization-modulated band bending at oxide interfaces”, *Appl. Phys. Lett.* **100**, 122903 (2012).
  16. H. J. Liu, C. W. Liang, W. I. Liang, H. J. Chen, **J. C. Yang**, C. Y. Peng, G. F. Wang, F. N. Chu, Y. C. Chen, H. Y. Lee, L. Chang, S. J. Lin, and Y. H. Chu, “Strain Driven Phase Boundaries in BiFeO<sub>3</sub> Thin Films Studied by Atomic Force Microscopy and X-ray Diffraction”, *Phys. Rev. B* **85**, 014104 (2012).
  17. R. K. Vasudevan, M. Baris Okatan, Y. Y. Liu, S. Jesse, **J. C. Yang**, W. I. Liang, Y. H. Chu, J. Y. Li, S. V. Kalinin, and V. Nagarajan, “Unraveling the origin of electromechanical response in a mixed-phase Bismuth Ferrite”, *Phys. Rev. B* **88**, 020402(R) (2013).
  18. **J. C. Yang**, Q. He, Y. M. Zhu, J. C. Lin, H. J. Liu, Y. H. Hsieh, Y. L. Chen, H. J. Lin, Q. Zhan, C. T. Chen, E. Arenholz, and Y. H. Chu, “Magnetic mesocrystals assisted magnetoresistance in manganite”, *Nano Lett.* **14**, 6073 (2014).
  19. **J. C. Yang**, C. H. Yeh, U. T. Chen, S. J. Suresha, H. J. Liu, C. W. Liang, S. L. Wu, Q. He, Y. P. Chiu, R. Ramesh, P. W. Chiu and Y. H. Chu “Control of Local Conduction of Ferroic Domain Walls via External Stimuli” *Nanoscale* **6**, 10524 (2014).
  20. **J. C. Yang**, Y. L. Huang, Q. He, and Y. H. Chu, “Multifunctionalities driven by ferroic domains”, *J. Appl. Phys.* **116**, 066801 (2014).
  21. V. T. Tra, **J. C. Yang**, Y. H. Hsieh, J. Y. Lin, Y. C. Chen, and Y. H. Chu, “Controllable Electrical Conduction at Complex Oxide Interfaces”, *Phys. Status Solidi RRL* **8**, 478 (2014).
  22. H. Y. Guo, J. G. Lin, **J. C. Yang**, and Y. H. Chu, “Dynamic magnetic interaction in La<sub>2/3</sub>Sr<sub>1/3</sub>MnO<sub>3</sub>/BiFeO<sub>3</sub> heterostructure”, *Appl. Phys. Lett.* **105**, 112406 (2014).
  23. **J. C. Yang**, Q. He, P. Yu, and Y. H. Chu, “BiFeO<sub>3</sub> Thin Films: A Playground to Electric-Field Control of Functionalities”, *Annu. Rev. Mater. Res.* **45**, 249-275 (2015).
  24. V. S. Kumar, **J. C. Yang**, Y. M. Zhu, Y. Y. Chin, H. J. Lin, C. T. Chen, Q. Zhan, Q. He, Y. C. Chen, and Y. H. Chu, “Enhanced magnetocaloric effect driven by interfacial magnetic coupling in self-assembled Mn<sub>3</sub>O<sub>4</sub>-(La,Sr)MnO<sub>3</sub> nanocomposite”, *ACS Appl. Mater. Interfaces* **7**, 26504 (2015).

25. **J. C. Yang\***, C. Ju\*, C. Luo, P. Shafer, H. J. Liu, Y. L. Huang, H. H. Kuo, F. Xue, C. W. Luo, L. Q. Chen, Q. He, P. Yu, E. Arenholz, X. M. Lu, and Y. H. Chu, "Anomalous electronic anisotropy triggered by ferroelectric coupling in multiferroic heterostructures", *Adv. Mater.* **28**, 876 (2016).
26. **J. C. Yang**, Q. He, C. Y. Kuo, H. J. Liu, H. C. Ding, C. G. Duan, Z. Hu, M. J. Huang, H. J. Lin, A. Tanaka, C. T. Chen, E. Arenholz, R. Ramesh and Y. H. Chu, "Electrically enhanced strong magnetization in highly strain BiFeO<sub>3</sub> films", *NPG Asia Mater.* **8**, e269 (2016).
27. (Invited) **J. C. Yang**, H. J. Liu, and Y. H. Chu, "Functional mesocrystal embedded oxide systems", *MRS Commun.* **7**, 167 (2016).
28. C. Y. Kuo, Z. Hu, **J. C. Yang**, S. C. Liao, Y. L. Huang, B. Yan, R. K. Vasudevan, H. J. Liu, E. Pellegrin, Q. He, S. V. Kalinin, C. H. Lai, Y. L. Soo, T. W. Pi, Y. H. Chu, and L. H. Tjeng, "Single antiferromagnetic axis in multiferroic BiFeO<sub>3</sub>", *Nature Commun.* **7**, 12712 (2016).
29. Y. M. Zhu, **J. C. Yang**, S. C. Liao, C. H. Lai, Q. He, Y. H. Chu, and Q. Zhan, "Structural evolution and magnetism in the mesocrystal-embedded nanocomposite", *ACS Appl. Mater. Interfaces* **8**, 1104 (2016).
30. Y. Li, Y. Jin, X. M. Lu, **J. C. Yang**, Y. H. Chu, F. Huang, J. S. Zhu, and S. W. Cheong, "Rewritable ferroelectric vortex pairs in BiFeO<sub>3</sub>", *npj Quant. Mater.* accepted. (2017)
31. L. Li, Y. ZHANG, L. Xie, J. R. Jokisaari, C. Beekman, **J. C. Yang**, Y. H. Chu, H. M. Christen, and X. Q. Pan, "Atomic-scale mechanisms of defect induced retention failure in ferroelectrics", *Nano Lett.* **17**, 3556 (2017).
32. R. K. Vasudevan, Y. Cao, N. Laanait, A. Ievlev, L. Li, **J. C. Yang**, Y. H. Chu, L. Q. Chen, S. V. Kalinin, and P. Maksymovych, "A new twist on domain wall conduction", *Nature Commun.* **8**, 1317(2017).
33. C. Yang, S. Xiao, **J. C. Yang**, X. M. Lu, Y. H. Chu, M. Zhou, F. Huang, J. Zhu, "Dry lubrication of friction on ferroelectric BiFeO<sub>3</sub> film", *Appl. Sur. Sci.* **457**, 797 (2018).
34. S. Yang, R. Peng, Q. He, Y. L. Huang, Y. Huang, **J. C. Yang**, T. Chen, J. Guo, L. Q. Chen, Y. H. Chu, C. W. Nan, and P. Yu, "Electric field writing of ferroelectric nano-domains near 710 domain walls with switchable interfacial conductivity", *Annalen der Physik* **530**, 1800130 (2018).
35. Y. Jin, S. Xiao, **J. C. Yang**, J. Zhang, X. M. Lu, Y. H. Chu, S. W. Cheong, J. Y. Li, Y. Kan, C. Yue, Y. Li, C. Ju, F. Huang, and J. Zhu, "Conductive tail-to-tail domain walls in epitaxial BiFeO<sub>3</sub> films", *Appl. Phys. Lett.* **113**, 082904 (2018).
36. J. W. Chen, S. T. Lo, S. C. Ho, S. S. Wong, T. H. Yen Vu, X. Q. Zhang, Y. D. Liu, Y. Y. Chiou, Y. X. Chen, **J. C. Yang**, Y. C. Chen, Y. H. Chu, Y. H. Lee, C. J. Chung, T. M. Chen, C. H. Chen and C. L. Wu "A Gate-free Monolayer WSe<sub>2</sub> p-n Diode", *Nature Commun.* **9**, 3143 (2018).
37. **J. C. Yang**, Y. D. Liou , W. Y. Tzeng, H. J. Liu, Y. W. Chang, P. H. Xiang, Z. Zhang, C. G. Duan, C. W. Luo, Y. C. Chen, and Y. H. Chu, "Ultrafast Giant Photostriction of Epitaxial Strontium Iridate Film with Superior Endurance", *Nano Lett.* **18**, 7742 (2018).
38. Y. D. Liou, Y. Y. Chiu, R. T. Hart, C. Y. Kuo, Y. L. Huang, Y. C. Wu, R. V. Chopdekar, H. J. Liu, A. Tanaka, C. T. Chen, C. F. Chang, L. H. Tjeng, Y. Cao, V. Nagarajan, Y. H. Chu, Y. C. Chen and **J. C. Yang\*** "Deterministic optical control of room temperature multiferroicity in BiFeO<sub>3</sub> thin films" *Nature Mater.* **18**, 580–587 (2019).
39. (Invited) Y.L. Huang, H. J. Liu, C. H. Ma, P. Yu, Y. H. Chu, and **J. C. Yang\*** "Pulsed laser deposition of complex oxide heteroepitaxy" *Chinese J Phys.* **60**, 481 (2019).

40. Y. C. Wu, S. Z. Ho, Y. C. Liu, Y. D. Liou, W. Y. Liu, S. W. Huang, J. Jiang, Y. C. Chen and **J. C. Yang**\* "Room Temperature Multiferroic PZTFT Thin Films" *ACS Appl. Electron. Mater.* **2**, 19 (2020).

### **Synergistic Activities**

Organizer, 2017 Taiwan Oxide Forum, Hsinchu, Taiwan

Organizer, 2018 Taiwan Oxide Forum, Hsinchu, Taiwan

Organizer, 2020 Taiwan Oxide Online Forum, Hsinchu, Taiwan

Peer review committee, Russian Science Foundation.