# LU, CHUN-YU (JIN-YOU)

Personal website
Mobile number:(+971) · 566 · 014 · 921
Email:chun.lu@ku.ac.ae

## EDUCATION

**National Taiwan University,** Taipei, Taiwan 2007 - 2011
*Ph.D. in Physics*
Advisor: Prof. Yuan-Huei Chang

**National Taiwan Normal University,**Taipei, Taiwan 2002 - 2006
*Bachelor of Science in Physics*

## PROFESSIONAL EXPERIENCE

**Khalifa University**, Abu Dhabi, United Arab Emirates 2018 - present
*Postdoctoral Research Fellow*

- Participate in the MI-MIT flagship project: High efficiency, lightweight, radiation-resistant space solar cells enabled by 2D material-based layer transfer (2DLT).
- Investigate the surface energy of graphene-coated substrates, which is the key to have a successful epitaxy growth of III-V semiconductor on semiconductor substrate.
- **Two major publications as the first author**:
  1. The evolution in graphitic surface wettability with first-principles quantum simulations: the counterintuitive role of water, published in *Physical Chemistry Chemical Physics*.
  2. Insights into graphene wettability transparency by locally probing its surface free energy, published in *Nanoscale*.
- Lead the research activities in the group for exploring electronic and optical properties of 2D-based materials, such as graphene/silver composite, InSe, and GeS, which are suitable for applications in downscaling of electronic devices.
- **Three major publications as the corresponding author:**
  1. Hybrid graphene metasurface for near-infrared absorbers, published in *Optics Express*.
  2. High-Temperature Defect-Induced Hopping Conduction in Multilayered Germanium Sulfide for Optoelectronic Applications in Harsh Environments, published in *ACS Applied Nano Materials*.
  3. Thickness-Dependent Resonant Raman and E'Photoluminescence Spectra of Indium Selenide and Indium Selenide/Graphene Heterostructures, published in *Journal of Physical Chemistry C*.

**Masdar Institute of Science and Technology**, Abu Dhabi, United Arab Emirates 2017 - 2018
*Postdoctoral Research Fellow*

- Participated in ADNOC project: Impact of Pore-scale Wettability Changes on Three-Phase Relative Permeability Characterization in Carbonate Reservoirs.
- Developed a methodology to directly predict the calcite surface wettability with first-principles quantum simulation, which could enhance energy production from the region's geological petroleum reservoirs.
- **Two major publications as the first author**:
  1. Direct Prediction of Calcite Surface Wettability with First-Principles Quantum Simulation, published in the *Journal of Physical Chemistry letter*, highlighted in the Emirates news.

2. Quantum Mechanical Prediction of Wettability of Multiphase Fluids–Solid Systems at Elevated Temperature, published in *Journal of Physical Chemistry C*.

**Masdar Institute of Science and Technology**, Abu Dhabi, United Arab Emirates 2015 - 2017
*Postdoctoral Research Fellow*

- Participated in the MI-MIT flagship project: High-Performance Compact Solar Thermal Power and Cooling Systems, in collaboration between Masdar Institute and Massachusetts Institute of Technology.
- Designed and fabricated advanced solar plasmonic absorbers to maximize solar efficiency by increasing solar absorption while maintaining low thermal emittance.
- **Two major publications as the first author**:
  1. Localized Surface Plasmon-Enhanced Ultrathin Film Broadband Nanoporous Absorbers, published in *Advanced Optical Materials*. This research has been reported in the MIT news.
  2. Near-Perfect Ultrathin Nanocomposite Absorber with Self-Formed Topping Plasmonic Nanoparticles, published in *Advanced Optical Materials*. This research has been reported in the UAE National news.

**Taiwan Semiconductor Manufacturing Company**, Hsinchu, Taiwan 2012 - 2014
*Principal Integration Engineer*

- Controlled the inline process, including lithography, etch, physical vapor deposition, and chemical vapor deposition, and all other cleanroom fabrications.
- Coordinated with several departments to solve issues and improve production recipes for yield enhancement.
- Tape out and produced several low power and high-performance IC chips for mobile phones and bitcoin mining manufacturer.
- Developed and vilificated a new process flow for the N28 CMOS image sensor in collaboration with an external Japanese company.
- Won the best presentation award for introduction to N28LP fabrication flow in the department of fabrication Integration of TSMC.

**National Taiwan University**, Taipei, Taiwan 2007 - 2011
*Ph.D. student*

- Analyzed several plasmonic core-shell structure that exhibits optical vortices and hot-spot near the gap regions by taking advantage of a home-made finite difference time domain method.
- Implemented an efficient dielectric function into the finite difference time domain method for simulating the coupling between localized surface plasmons of nanostructures.
  1. Results were published in Superlattices and Microstructures.
  2. Results were implemented in a free optical simulation software called GSVIT.
- Contributed to the construction of geometries of discrete-dipole approximation ADDA, which is a free light scattering software code in its beginning stage.
- Graduated with a perfect GPA and received the Dean's award.

## EXPERTISE

| | |
|---|---|
| **Optical computation** | Finite-difference time-domain method (FDTD),<br>Rigorous coupled-wave analysis (RCWA) |
| **Density functional theory** | Plane-wave based QuantumEspresso,<br>Linear combination atomic orbitals-based Quantumwise |
| **Thin-film depositions** | chemical vapor deposition, sputtering, thermal |
| **CMOS fabrication technology** | 28 nm low/high power platform technology |
| **Analytical technique** | electron microscopy, Raman, UV-Vis, Filmetric optical spectroscopy |
| **Programming Languages** | Fortran, C, Python, OpenMP, MPI, CUDA |

## PUBLICATION

### Peer-reviewed Journal Papers

1. B. Alfakes, J.E. Villegas, H. Apostoleris, R. S. Devarapalli, S. R. Tamalampudi, **J.-Y. Lu**, J. Viegas, I. Almansouri, and M. Chiesa, "Optoelectronic Tunability of Hf Doped ZnO for Photovoltaic Applications," ***Journal of Physical Chemistry C***, vol. 123, no. 24, pp. 15258-15266, 2019.
2. A. Al-Hagri, R. Li, N. S. Rajput, **J.-Y. Lu**, S. C., K. Sloyan, M. A. Almahri, S. R. Tamalampudi, M. Chiesa, and A. A. Ghaferi, "Direct growth of single-layer terminated vertical graphene array on germanium by plasma-enhanced chemical vapor deposition," ***Carbon***, vol. 155, pp. 320-325, 2019.
3. **J.-Y. Lu**, Q. Ge, A. Raza, and T. J. Zhang, "Quantum Mechanical Prediction of Wettability of Multiphase Fluids-Solid Systems at Elevated Temperature," ***Journal of Physical Chemistry C***, vol. 123, no. 20, pp. 12753-12761, 2019.
4. S. R. Tamalampudi, R. Sankar, H. Apostoleris, M. A. AlMahri, B. Alfakes, A. Al-Hagri, R. Li, A. Gougam, I. Almansouri, M. Chiesa, and **J.-Y. Lu***, "Thickness-Dependent Resonant Raman and E$'$ Photoluminescence Spectra of Indium Selenide and Indium Selenide\Graphene Heterostructures," ***Journal of Physical Chemistry C***, vol. 123, no. 24, pp. 15345-15353, 2019.
5. Md. M. Rahman, A. Raza, H. Younes, A. AlGhaferi, M. Chiesa, and **J.-Y. Lu***, "Hybrid graphene metasurface for near-infrared absorbers," ***Optics Express***, vol. 27, no. 18, pp. 24866-24876, 2019.
6. S. R. Tamalampudi, S. Patole, B. Alfakes, R. Sankar, I. Almansouri, M. Chiesa, and **J.-Y. Lu***, "High-Temperature Defect-Induced Hopping Conduction in Multi-Layered Germanium Sulfide for Optoelectronics Applications in Harsh Environments," ***ACS Applied Nano Materials***, vol. 2, no. 4, pp. 2169-2175, 2019.
7. **J.-Y. Lu**, T. A. Olukan, S. R. Tamalampudi, A. Al-Hagri, C.-Y. Lai, M. A. Almahri, H. Apostoleris, I. Almansouri, and M. Chiesa, "Insights into Graphene Wettability Transparency by Locally Probing its Surface Free Energy," ***Nanoscale***, 11, pp. 7944-7951, 2019.
8. Afra S. Alketbi, B. Yang, A. Raza, M. Zhang, **J.-Y. Lu**, Z. Wang, and T. J. Zhang, "Sputtered SiC coatings for radiative cooling and light absorption," ***Journal of Photonics for Energy***, 9(3), 032703, 2018.
9. K. Sloyan, C.Y. Lai, **J.-Y. Lu**, B. Alfakes, S. A. Hassan, I. Almansouri, M. S. Dahlem, and M. Chiesa, "Discerning the Contribution of Morphology and Chemistry in Wettability Studies," ***The Journal of Physical Chemistry A***, vol. 122, no. 38, pp. 7768–7773, 2018.
10. Y.-C. Chiou, T. A. Olukan, M. A. Almahri, H. Apostoleris, C.-H. Chiu, C.-Y. Lai, **J.-Y. Lu**, S. Santos, I. Almansouri, and M. Chiesa, "Direct Measurement of the Magnitude of the van der Waals Interaction of Single and Multilayer Graphene," ***Langmuir***, vol. 34, no. 41, pp. 12335–12343, 2018.
11. **J.-Y. Lu**, C.-Y. Lai, I. Almansour, and M. Chiesa, "The evolution in graphitic surface wettability with first-principles quantum simulations: the counterintuitive role of water," ***Physical Chemistry Chemical Physics***, 20, pp. 22636-22644, 2018.
12. X. Q. Li, J. L. Li, **J.-Y. Lu**, N. Xu, C. L. Chen, X. Z. Min, B. Zhu, H. X. Li, L. Zhou, S. N. Zhu, T. J. Zhang, and J. Zhu, "Enhancement of Interfacial Solar Vapor Generation by Environmental Energy," ***Joule***, vol. 2, no. 7, pp. 1331-1338, 2018.
13. A. Raza, **J.-Y. Lu**, S. Alzaim, H. Li, and T. J. Zhang, "Novel Receiver-Enhanced Solar Vapor Generation: Review and Perspectives," ***Energies***, vol. 11, no. 1, pp. 253, 2018. (Invited review)
14. **J.-Y. Lu**, Q. Ge, H. Li, A. Raza, and T. J. Zhang, "Direct Prediction of Calcite Surface Wettability with First-Principles Quantum Simulation," ***Journal of Physical Chemistry Letters***, vol. 8, no. 21, pp. 5309–5316, 2017.

15. **J.-Y. Lu**, A. Raza, S. Noorulla, Afra S. Alketbi, N. X. Fang, G. Chen, and T. J. Zhang, "Near-Perfect Ultra-thin Nanocomposite Absorber with Self-Formed Topping Plasmonic Nanoparticles," ***Advanced Optical Materials***, 5, 1700222, 2017.
16. **J.-Y. Lu**, A. Raza, N. X. Fang, G. Chen, and T. J. Zhang, "Effective dielectric constants and spectral density analysis of plasmonic nanocomposites," ***Journal of Applied Physics***, vol. 120, no. 16, 163103, 2016.
17. Md. M. Rahman, H. Younes, **J.-Y. Lu**, G. W. Ni, S. J. Yuan, N. X. Fang, T. J. Zhang, and A. AlGhaferi, "Broadband Light Absorption by Silver Nanoparticles Decorated Silica Nanospheres," ***RSC Advance***, 6, pp. 107951-107959, 2016.
18. **J.-Y. Lu**, S. H. Nam, K. Wilke, A. Raza, Y. K. Lee, A. A. Ghaferi, N. X. Fang, and T. J. Zhang, "Localized Surface Plasmon Enhanced Ultrathin Film Broad-Band Nanoporous Absorbers," ***Advanced Optical Materials***, vol. 4, no. 8, pp. 1255-1264, 2016.
19. H. R. Liu, A. Raza, A. Aili, **J.-Y. Lu**, A. AlGhaferi, and T. J. Zhang, "Sunlight-Sensitive Anti-Fouling Nanostructured $TiO_2$ coated Cu Meshes for Ultrafast Oily Water Treatment," ***Scientific Reports***, 6, 25414, 2016.
20. Y. W. Lin, W. J. Chen, **J.-Y. Lu**, Y. H. Chang, C. T. Liang, Y. F. Chen, and J. Y. Lu, "Growth and characterization of ZnO/ZnTe core/shell nanowire arrays on transparent conducting oxide glass substrates," ***Nanoscale Research Letters***, 7:401, 2012.
21. **J.-Y. Lu**, H. Y. Chao, J. C. Wu, S. Y. Wei, and Y. H. Chang, "Metallic-shell nanocylinder arrays for surface-enhanced spectroscopies," ***Nanoscale Research Letters***, 6:173, 2011.
22. H. Y. Chao, S. H. You, **J.-Y. Lu**, J. H. Cheng, Y. H. Chang, and C. T. Wu, "The growth and characterization of ZnO/ZnTe core-shell nanowires and the electrical properties of ZnO/ZnTe core-shell nanowires field-effect transistor," ***Journal of Nanoscience and Nanotechnology***, vol. 11, no. 3, pp. 2042-2046, 2011.
23. **J.-Y. Lu** and Y. H. Chang, "The lightening mode in a core-shell nanocylinder dimer," Optics Communications," ***Optics Communications***, vol. 283, no. 12, pp. 2627-2630, 2010.
24. **J.-Y. Lu**, H. Y. Chao, J. C. Wu, S. Y. Wei, Y. H. Chang, and S. C. Chen, "Retardation-induced plasmon modes in silica-core gold-shell nanocylinder pair," ***Physica E***, 42, pp. 2583-2587, 2010.
25. **J.Y. Lu** and Y.H. Chang, "Implementation of an efficient dielectric function into the finite difference time domain method for simulating the coupling between localized surface plasmons of nanostructures," ***Superlattices and Microstructures***, vol. 47, no. 1, pp. 60-65, 2010.
26. H. Y. Chao, J. H. Cheng, **J.-Y. Lu**, Y. H. Chang, C. L. Cheng, Y. F. Chen, and C. T. Wu, "Growth and characterization of type-II ZnO/ZnTe core-shell nanowire arrays for solar cell applications," ***Superlattices and Microstructures***, vol. 47, no. 1, pp. 160-164, 2010.
27. **J.-Y. Lu** and Y. H. Chang, "Optical singularities associated with the energy flow of two closely spaced core-shell nanocylinders," Optics Communications," ***Optics Express***, vol. 17, no. 22, pp. 19451-19458, 2009.

**Conference Papers**

1. **J.-Y. Lu**, Md. M. Rahman, and M. Chiesa, "Amorphous Graphene-Based Plasmonic Metasurface for Near-Infrared Absorbers," *American Physical Society*, Apr. 16-19, 2019, Denver, USA.
2. **J.-Y. Lu**, C.-Y. Lai, M. A. Almahri, T. Olukan, H. Apostoleris, I. Almansouri, and M. Chiesa, "Prediction of Surface Wettability of Fresh and Aged Graphite Surfaces from First-Principles Density Functional Theory Simulations," *Material Research Society Fall*, Nov. 25-30, 2018, USA.
3. **J.-Y. Lu**, S. Noorulla, N. X. Fang, and T. J. Zhang, "Design of Broadband Ultrathin Film Nanoporous Solar Absorbers," *Micro/Nanoscale Heat & Mass Transfer International Conference*, Jan. 1-4, 2016, Biopolis, Singapore.
4. **J.-Y. Lu**, A. Raza, N. X. Fang, G. Chen, and T. J. Zhang, "Optical Characterizations of Plasmonic Nanocomposites," *The 8th Annual International Workshop on Advanced Materials*, Feb. 21-23, 2016, Ras Al Khamiah, UAE.
5. S. Noorulla, **J.-Y. Lu**, S. H. Nam, N. X. Fang, and T. J. Zhang, "Plasmon-Enhanced Solar Absorbers," *The 8th Annual International Workshop on Advanced Materials*, Feb. 21-23, 2016, Ras Al Khamiah, UAE.

6. A. Alketbi, **J.-Y. Lu**, and T. J. Zhang, "Design and Performance of Passive Radiative Cooler under Direct Sunlight," *The Graduate Students Research Conference*, Mar. 20-22, 2016, Al Ain, UAE.
7. S. Noorulla, **J.-Y. Lu**, A. Raza, and T. J. Zhang, "Near Perfect Broadband Absorber Based on Random Metal Nanoparticles with Varied Spacer layers," *The Graduate Students Research Conference*, Mar. 20-22, 2016, Al Ain, UAE.
8. **J.-Y. Lu**, D. Liu, K. Wilke, S. Noorulla, N. X. Fang, and T. J. Zhang, "Plasmon-Enhanced Ultrathin Film Broad-Band Nanoporous Absorber," *American Physics meeting (ASP)*, Mar. 2-6, 2015, San Antonio, USA.
9. **J.-Y. Lu**, and Y. H. Chang, "Plasmonic core-shell nanostructures for surface-enhanced spectroscopies" *The 14th International Conference on Modulated Semiconductor structures (MSS-14)*, 2011, Florida, USA.
10. **J.-Y. Lu**, H. Y. Chou, J. C. Wu, S. Y. Wei, and Y. H. Chang, "ZnO nanowire arrays on transparent conducting oxide glass" *The 16th International Conference on Superlattices, Nanostructures and Nanodevices*, 2010, Beijing, China.
11. **J.-Y. Lu** and Y. H. Chang, "Implementation of an efficient dielectric function into the finite difference time domain method" *The 9th International Conference on Physics of Light-Matter Coupling in Nanostructures*, 2009, Leece, Italy.

## HONORS/AWARDS

1. Best Poster Award, "Direct Growth of Single-layer Terminated Vertical Graphene Array on Germanium by Plasma Enhanced Chemical Vapor Deposition", IEEE Nanotechnology Council's NMDC 2019 conference.
2. Top 5 Papers, "Localized Surface Plasmon-Enhanced Ultrathin Film Broadband Nanoporous Absorbers", Advanced Optical Materials, July 2016.
3. Best Paper Award, "Design and Performance of Passive Radiative Cooler under Direct Sunlight", UAE Graduate Students Research Conference (GSRC), May 2016.
4. Best Presentation Award, "Induction to fabrication flow induction to N28LP fabrication process", Department of fabrication Integration, TSMC, 2014.
5. Dean′s Award, Department of Physics, National Taiwan University, 2011.

## REFERENCES

1. Name: Prof. Yuan-Huei Chang
   Affiliation: Department of Physics, National Taiwan University, Taiwan.
   Email: yhchang@phys.ntu.edu.tw
   Relationship: Ph.D. advisor

2. Name: Prof. Thomas C.-K. Yang
   Affiliation: National Taipei University of Technology, Taiwan
   Email: ckyang@mail.ntut.edu.tw

3. Name: Ms. Ya-Ling Huang
   Affiliation: Taiwan Semiconductor Manufacturing Company Limited (TSMC), Taiwan
   Email: ylhuangp@tsmc.com

4. Name: Prof. Daniel Choi
   Affiliation: Department of Mechanical Engineering, Khalifa University, UAE
   Email: daniel.choi@ku.ac.ae

5. Name: Prof. TieJun Zhang
   Affiliation: Department of Mechanical Engineering, Khalifa University, UAE

Email: tiejun.zhang@ku.ac.ae

6. Name: Prof. Nicholas X. Fang
   Affiliatioin: Department of Mechanical Engineering, Massachusetts Institute of Technology, USA
   Email: nicfang@mit.edu

7. Name: Dr. Ibraheem Almansouri
   Affiliatioin: Head Of Engineering at Masdar (Abu Dhabi Future Energy Company), UAE
   Email: ialmansouri2010@googlemail.com