

CURRICULUM VITAE

Won-Jun Jang

- Citizenship** Republic of Korea
- Education**
- Korea university, Seoul, Korea**
- Ph.D., Department of Physics (2008.03 ~ 2014.02)
 - Dissertation Topic, “Local electronic structures of epitaxial graphene studied using scanning tunneling microscopy”
 - Advisor: Prof. Se-Jong Kahng
- Korea university, Seoul, Korea**
- B.S. Department of Physics (2001.03~ 2008.02)
- Honors / Awards** **Young vacuum scientist award**, Korean Vacuum Society (2014.02)
- Research Experiences**
- Staff Researcher,** (2020.06 ~ 2022.04)
Samsung Advanced Institute of Technology (SAIT)
- Topic: Topological physics in low dimensional materials
 - Ferroelasticity and ferroelectricity of transition metal dichalcogenides
 - High order topological state in a domain boundary of MoTe₂
 - Multiband charge density waves in NbTe₂
 - Impurity states in a topological Dirac nodal line semimetal, SrAs₃
- Postdoctor,** (2017.04 ~ 2020.05)
Center for quantum nanoscience, IBS
- Topic: Electron spin resonance of single atom on a surface
 - Electron spin resonance of single atom on a surface
 - Construction of IBM type scanning tunneling microscope.
 - Optics combined STM using continuous flow type cryostat
 - 10 mK Radio frequency STM with 2-axis vector magnet
- Research Fellow,** (2015.04 ~ 2017.03)
Center for axion and precision physics research, IBS
- Topic: High T_c superconductivity
 - Direct observation of enhancement of superconductivity by interfacial phonons in perovskite-clad FeAs monolayers.
 - Atomic-scale observation and manipulation of plaquette antiferromagnetic order coexisting with iron superconductivity.
 - Development of radio frequency superconducting cavity.
- Postdoctor,** (2014.04 ~ 2015.03)
Nanophysics Lab, Department of physics, Korea university
- Topic: Graphene physics
 - Observations of new Dirac points in one-dimensionally-rippled graphene on hexagonal boron nitride.
 - Study of electronic structures near zigzag interfaces of graphene on hexagonal boron nitride (h-BN) on Cu foil.

Integrated master's and doctoral degree course, (2008.03 ~ 2014.02)
Nanophysics Lab, Department of physics, Korea university

- Topic: Epitaxial Graphene on Metal and Boron nitride
 - Study of epitaxial growth of graphene by surface segregation and chemical vapor deposition on Ru(0001).
 - Observation of recovery of Dirac cones in oxygen-intercalated graphene on Ru(0001).
 - Study of local electronic structures of hydrogenated graphene on Ru(0001).
 - Observation of electronic structures of strained graphene in a graphene on BN on Cu foil.

Academic Experiences

Visiting Researcher, (2013.10 ~ 2014.03)
Institute for Solid State Physics, Univ. of Tokyo, Japan

Lecturer, (2011.03 ~ 2013.08)
Department of physics, Korea university

Teaching Assistant, (2008.03 ~ 2011.02)
Department of physics, Korea university

Technical Skills

Construction and operation of a low temperature scanning tunneling microscope system.

- Design of RF cavity combined STM head.
- Construction of a Besocke-type STM head.
- Construction of IBM type STM head using Radio frequency.
- Construction of a LT-STM system using continuous flow type cryostat.
- Construction and maintenance of a 10 mK radio frequency STM system using dilute Refrigerator (Janis DR 250, Janis DR 500).
- Design of a UHV compatible He⁴ cryostat and UHV compatible He³ cryostat using Joule Thomson effect.
- Design of a heat exchange for a UHV compatible He⁴ cryostat using the exhausted cold He⁴ gas.
- Design of a ultra-high vacuum (UHV) chamber for molecular beam epitaxy.
- Operation and repair of Unisoku low temperature STM

Measurement and analysis skills

- Simulation of density modulation of charge density waves.
- Electron spin resonance measurement on single atom.
- Spin polarized scanning tunneling measurement using Cr coated antiferromagnetic tip.
- Quasi particle interference measurement and analysis.
- 2-Dimension local work-function measurements.

Sample preparation skills.

- Preparation of the clean surface of metal single crystals.
- Growth of epitaxial graphene on Ru(0001) using chemical vapor deposition.
- Growth of Nb derivative superconducting thin film using magnetron sputtering process.
- Preparation of cleaved surface for surface measurements of layered materials.
- Development of evaporators for metallic and organic materials.

- Construction of high-pressure gas handling systems.

Electronics & Programming skills.

- Development of a 16 bit analog digital converter for data acquisition.
- Development of a summing circuit to add AC modulation to DC voltage signal for Lock-in detection.
- Modification of the STM controlling program with Microsoft Visual C++.
- Mathematica programming (Wolfram Research) for quasi particle interference analysis.

Research interests

- RF measurement on a magnetic atom on insulator and superconductor.
- Qubit using rare earth atom.
- High order topological state in TMD.
- Ferroelasticity and ferroelectricity in TMD.

Publication

28. Van Luan Nguyen, Minsu Seol, Junyoung Kwon, Eun-Kyu Lee, **Won-Jun Jang**, Hyowon Kim, Ce Liang, Jong Hoon kang, Jiwoong Park, Min Seok Yoo, and Hyeon-Jin Shin, “Adhesion-lithography of transition metal dichalcogenide for wafer-scale integration”, *Submitted*.

27. **Won-Jun Jang**, Junyoung Sim, Jineun Heo, Ryung Kim, Seo Hyoung Chang, Sangjun Jeon, and Hyo Won Kim, “Direct observation of multiband charge density waves in NbTe₂”, *Submitted*.

26. Hyo Won Kim, Won-Jae Joo, **Won-Jun Jang**, Seong Heon Kim, “Pseudo graphene nanoribbon in graphene controlled by Ge(110) surface reconstruction”, *Submitted*.

25. **Won-Jun Jang**, Heeyoon Noh, JiYeon Ku, Hyo Won Kim, “Ferroelastic Domain Switching in 1T’-MoTe₂”, *Submitted*.

24. Danho Ahn, Ohjoon Kwon, Woohyun Chung, **Wonjun Jang**, Doyu Lee, Jinhwan Lee, Sung Woo Youn, HeeSu Byun, Dojun Youm and Yannis K. Semertzidis, “First prototype of a biaxially textured YBa₂Cu₃O_{7-x} microwave cavity in a high magnetic field for dark matter axion search”, *Accepted in Physical Review Applied* (2022).

23. Jinkyung Kim[†], **Won-jun Jang[†]**, Thi Hong Bui, Deung-Jang Choi, Christoph Wolf, Fernando Delgado, Yi Chen, Denis Krylov, Soonhyeong Lee, Sangwon Yoon, Christopher P. Lutz, Andreas J. Heinrich, and Yujeong Bae, “Spin resonance amplitude and frequency of a single atom on a surface in a vector magnetic field”, *Physical Review B* 104 (17), 174408 (2021).

22. JH Park, MH Chang, **Won-Jun Jang**, S Han, SJ Kahng, “Phase-separated indenofluorene arrays stabilized by hydrogen and halogen bonds on Au (111)” *Journal of Vacuum Science & Technology A: Vacuum, Surfaces, and Films* 40 (2021).

21. MH Chang, **Won-Jun Jang**, MW Lee, S Han, SJ Kahng, “One-dimensional structures of three quinone molecules on Au (111)”, *Surface Science* 713, 121911 (2021).

20. UnSeung Jeon, Min Hui Chang, **Won-Jun Jang**, Soon-Hyung Lee, Seungwu

Han, Se-Jong Kahng, “Two-dimensional networks of brominated Y-shaped molecules on Au(111)”, *Applied Surface Science* 432 332–336 (2018).

19. Min Hui Chang, **Won-Jun Jang**, Min Wook Lee, Un Seung Jeon, Seungwu Han, Se Jong Kahng, “Networks of non-planar molecules with halogen bonds studied using scanning tunneling microscopy on Au (111)”, *Applied Surface Science* 432 332–336 (2018).

18. Seokhwan Choi, Hyoung Joon Choi, Jong Mok Ok, Yeonghoon Lee, **Won-Jun Jang**, Alex Taekyung Lee, Young Kuk, SungBin Lee, Andreas J. Heinrich, Sang-Wook Cheong, Yunkyung Bang, Steven Johnston, Jun Sung Kim, and Jinhwan Lee, “Switching Magnetism and Superconductivity with Spin-Polarized Current in Iron-Based Superconductor”, *Phys. Rev. Lett.* 119, 227001 (2017).

17. Seokhwan Choi, Steven Johnston, **Won-Jun Jang**, Klaus Koepf, Ken Nakatsukasa, Jong Mok Ok, Hyun-Jung Lee, Hyun Woo Choi, Alex Taekyung Lee, Alireza Akbari, Yannis K. Semertzidis, Yunkyung Bang, Jun Sung Kim, and Jinhwan Lee, “Correlation of Fe-Based Superconductivity and Electron-Phonon Coupling in an FeAs / Oxide Heterostructure”, *Phys. Rev. Lett.* 119, 107003 (2017).

16. Jeong Heum Jeon, Howon Kim, **Won-Jun Jang**, Jungpil Seo and Se-Jong Kahng, “Thickness-dependent Dirac dispersions of few-layer topological insulators supported by metal substrate”, *Nanotechnology* 28 215207 (2017).

15. B. R. Ko, H. Themann, **W. Jang**, J. Choi, D. Kim, M. J. Lee, J. Lee, E. Won and Y. K. Semertzidis, “Electric and magnetic energy at axion haloscopes.”, *Phys. Rev. D.* 94, 111702 (2016).

14. **Won-Jun Jang**, Min Wook Lee, Sangwoo Park, Seong Jun Jung, Sungjoo Lee, Young Jae Song, and Se-Jong Kahng, “Observations of new Dirac points in one-dimensionally-rippled graphene on hexagonal BN using scanning tunneling spectroscopy”, *J. Phys. Chem. C*, 119 (33), pp 19535–19538 (2015).

13. Howon Kim, Yun Hee Chang, **Won-Jun Jang**, Yong-Hyun Kim, and Se-Jong Kahng, “Probing single-molecule dissociations from a bimolecular complex NO-Co-Porphyrin”, *ACS Nano* 9, 7722-7728 (2015).

12. JeongHeum Jeon, Misun Song, Howon Kim, **Won-Jun Jang**, Ji-Yong Park, Seokhyun Yoon, Se-Jong Kahng, “Quintuple layer Bi₂Se₃ thin films directly grown on insulating SiO₂ using molecular beam epitaxy”, *Applied Surface Science* 316 42–45(2014).

11. Min Wang, Minwoo Kim, Dorj Odkhuu, Joohyun Lee, **Won-Jun Jang**, Se-Jong Kahng, Noejung Park, Rodney S. Ruoff, Young Jae Song, and Sungjoo Lee, “Catalytic Transparency of Hexagonal Boron Nitride on Copper for Chemical Vapor Deposition Growth of Large-Area and High-Quality Graphene”, *ACS Nano* 8, 5478–5483 (2014).

10. **Won-Jun Jang**, Kyung-Hoon Chung, Min Wook Lee, Howon Kim, Sungjun Lee, Se-Jong Kahng, “Tetragonal porous networks made by rod-like molecules on Au(1 1 1) with halogen bonds”, *Appl. Surf. Sci.* 309 74–78 (2014).

9. **Won-Jun Jang**, Yong-Ro Shin, Howon Kim, Min Wang, Sung Kyu Jang,

Minwoo Kim, Sungjoo Lee, Sang-Woo Kim, Young Jae Song, Se-Jong Kahng, “Observation of spatially-varying Fermi velocity in strained-graphene directly grown on hexagonal BN”, *Carbon*, **74**, 139 (2014).

8. **Won-Jun Jang**, Se-Jong Kahng, “Epitaxial growth of graphene by surface segregation and chemical vapor deposition on Ru(0001) studied with scanning tunneling microscopy”, *Journal of Korean Vacuum Society*.2013, **22**, 6, 285.

7. **Won-Jun Jang**, Howon Kim, Jeong Heum Jeon, Jong Keon Yoon, and Se-Jong Kahng, “Recovery and local-variation of Dirac cones in oxygen-intercalated graphene on Ru(0001) studied using scanning tunneling microscopy and spectroscopy”, *Phys. Chem. Chem. Phys.*, 2013,15, 16019.

6. Min Wang, Sung Kyu Jang, **Won-Jun Jang**, Minwoo Kim, Seong-Yong Park, Sang-Woo Kim, Se-Jong Kahng, Jae-Young Choi, Rodney S. Ruoff, Young Jae Song, Sungjoo Lee, “A platform for large-scale graphene electronics – CVD growth of single-layer graphene on CVD-grown hexagonal Boron Nitride”, *Adv. Mater.* 2013, **25**, 2746–2752.

5. Seung-Kyun Noh, Jeong Heum Jeon, **Won-Jun Jang**, Howon Kim, Soon-Hyeong Lee, Min Wook Lee, Jinhwan Lee, Seungwu Han, Se-Jong Kahng, “Supramolecular Cl-H and O-H interactions in self-assembled 1,5-Dichloroanthraquinone layers on Au(111)”, *Chem. Phys. Chem.* 2013, **14**, 1177 – 1181 1177.

4. Ji Yeon Kim, **Won-Jun Jang**, Howon Kim, Jong Keon Yoon, Jihun Park, Se-Jong Kahng, Jinhwan Lee, Seungwu Han, “Supramolecular interactions of anthraquinone networks on Au(111): Hydrogen bonds and van der Waals interactions”, *Applied Surface Science* 268 (2013) 432–435.

3. Kyung-Hoon Chung, Howon Kim, **Won-Jun Jang**, Jong Keon Yoon, Se-Jong Kahng, Jinhwan Lee, Seungwu Han, “Molecular multistate systems formed in two-dimensional porous networks on Ag(111)”, *J. Phys. Chem. C* 2013, **117**, 302–306.

2. Jeong Heum Jeon, **Won-Jun Jang**, Jong Keon Yoon and Se-Jong Kahng, “Metal-supported high crystalline Bi₂Se₃ quintuple layers”, *Nanotechnology* 22 (2011) 465602.

1. Howon Kim, Won-joon Son, **Won-Jun Jang**, Jong Keon Yoon, Seungwu Han and Se-Jong Kahng, “Mapping the electronic structures of a metalloporphyrin molecule on Au(111) by scanning tunneling microscopy and spectroscopy”, *Phys. Rev. B* 80, 245402 (2009).

Patent

3. **Won-Jun Jang**, JiYeon Ku, Hyo Won Kim, Heeyoon Noh “Method for fabrication of domains and domain boundaries on TMD (Transition Metal Dichalcogenide) surfaces using scanning probe microscope”, Registration date: 2021-10-05, Registration number: P20210131970

2. Jinhwan Lee, **Won-Jun Jang**, Donghyun Son, Yannis K. Semertzidis, “NON-CONTACT TYPE SLIDING DOOR SYSTEM FOR OPENING AND CLOSING”, Registration date: 2019-06-03, Registration number: 10-1987261-0000

1. Jinhwan Lee, **Won-Jun Jang**, Donghyun Son, Yannis K. Semertzidis, “CRYOSTAT USING MULTIPLE NUMBER OF BOTH SIDED HEAT

EXCHANGERS”, Registration date: 2018-11-19, Registration number: 10-1921542-0000

Presentation

- International -

14. W.J. Jang, K. Howon, W. Min, J. Sung kyu, K. Minwoo, L. Sungjoo, S. Young Jae, K. Se-Jong, “Unbalanced standing wave patterns at a graphene p-n junction caused by chiral electron reflection”, ICN+T 2018, Brono, Czech republic (July, 2018).

13. Won-Jun Jang, Seokhwan Choi, Hyunjung Lee, Jong Mok Ok, Hyunwoo Choi, Alex Taekyung Lee, Alireza Akbari, Hwansoo Suh, Jayong Ku, Yannis Semertzidis, Yunkyung Bang, Jun Sung Kim, Jhinhwan LEE, “Pairing enhancement by interfacial phonons in a bulk crystal of perovskite-clad FeAs monolayers”, 20th International Vacuum Congress, Busan, Korea, (August, 2016).

12. Won-Jun Jang, Seokhwan Choi, Jong Mok Ok, Hyun Woo Choi, Hyun Jung Lee, Jin Oh Jung, Dong Hyun Son, Hwan Soo Suh, Jun Sung Kim, Yannis K. Semertzidis, Jhinhwan Lee, “Observation of coexistence of itinerant electronic states and local moments in parents compound superconductor $\text{Sr}_4\text{V}_2\text{O}_6\text{Fe}_2\text{As}_2$ ”, APS March meeting, Baltimore, MD, USA, (March, 2016).

11. Jeong Heum Jeon, Joon-Suh Park, Howon Kim, Won-Jun Jang, Jinhee Han, Hyungjun Lee, Hyung-Joon Choi, Se-Jong Kahng, “Identifying Antisite and Vacancy Defects in n-doped Bi_2Se_3 Topological Insulators from Scanning Tunneling Microscopy and First Principles Calculations”, APS March meeting, Denver, Colorado, USA, (March, 2014).

10. Won-Jun Jang, Yong-Ro Shin, Howon Kim, Min Wang, Sung Kyu Jang, Minwoo Kim, Sungjoo Lee, Sang-Woo Kim, Young Jae Song, Se-Jong Kahng, “Observation of spatially-varying Fermi velocity in strained-graphene directly grown on hexagonal BN”, Atomically Controlled Surfaces, Interfaces and Nanostructures (ACSIN)-12, Tsukuba, Japan, (November, 2013).

9. Won-Jun Jang, Yong-Ro Shin, Howon Kim, Min Wang, Sung Kyu Jang, Minwoo Kim, Sungjoo Lee, Sang-Woo Kim, Young Jae Song, Se-Jong Kahng, “Observation of spatially-varying Fermi velocity in strained-graphene directly grown on hexagonal BN”, International Conference on the Formation of Semiconductor Interfaces 14, Gyeongju, Korea, (July, 2013).

8. Won-Jun Jang, Yong-Ro Shin, Howon Kim, Min Wang, Sung Kyu Jang, Minwoo Kim, Sungjoo Lee, Sang-Woo Kim, Young Jae Song, Se-Jong Kahng, “STM/STS study of graphene directly grown on h-BN films on Cu foils”, APS March meeting, Baltimore, MD, USA, (March, 2013).

7. Won-Jun Jang, Jeong Heum Jeon, Jong Keon Yoon, Se-Jong Kahng, “Electronic structures of graphene intercalated by oxygen on Ru(0001): Scanning tunneling spectroscopy study”, Nano Korea 2012, Seoul, Korea, (August, 2012).

6. Won-Jun Jang, Jong Keon Yoon, Howon Kim, Se-Jong Kahng, “Electronic structures of graphene on Ru(0001): Scanning tunneling spectroscopy study”, APS March meeting, Boston, USA, (March, 2012).

5. Won-Jun Jang, Jong Keon Yoon, Howon Kim, Se-Jong Kahng, “ Modified electronic structure of distorted graphene on Ru(0001) : STM and STS study”, APS March meeting, Portland, Oregon, USA, (March, 2010).

4. Won-Jun Jang, Jong Keon Yoon, Howon Kim, Se-Jong Kahng, “Electronic structures of hydrogenated graphene: Scanning tunneling spectroscopy study”, International Conference on Nanoscience + Technology (ICN+T), Paris, France, (July, 2012).

3. Won-Jun Jang, Jong Keon Yoon, Howon Kim, Se-Jong Kahng, “Electronic structures of graphene on Ru(0001): STM and STS study”, International Conference on Nanoscience + Technology (ICN+T 2010), Beijing, China, (August, 2010).

2. Won-Jun Jang, Jeong Heum Jeon, Kyung-Hoon Chung, Howon Kim, Se-Jong Kahng, “Corner hole adatom stacking fault structure of Bi on Au(111)”, JSPS-NSFC-KOSEF A3 Foresight Meeting, Xiamen, China, (February, 2009).

1. Won-Jun Jang, Jeong Heum Jeon, Kyung-Hoon Chung, Howon Kim, Se-Jong Kahng, “Corner hole adatom stacking fault structure of Bi on Au(111)”, International Conference on Nanoscience + Technology (ICN+T), Colorado, USA, (July, 2008).

- Domestic -

10. Won-Jun Jang, Heeyoon Noh, Jiyeon Ku, Hyowon Kim, “Ferroelastic Domain Switching in 1T'-MoTe₂”, Korean Physical Society, (October, 2021).

9. Won-Jun Jang, Seokhwan Choi, Jong Mok Ok, Hyun Woo Choi, Hyun Jung Lee, Jin Oh Jung, Dong Hyun Son, Hwan Soo Suh, Jun Sung Kim, Yannis K. Semertzidis, Jhinhwan Lee, “Direct observation of dynamics of magnetic topological defects in parents compound superconductor Sr₂VO₃FeAs”, Korean Physical Society, (April, 2016).

8. Won-Jun Jang, Seokhwan Choi, Jong Mok Ok, Hyun Jung Lee, Hyun Woo Choi, Se-Jong Kahng, Young Kuk, Jayong Koo, Sang-wook Cheong, Jun Sung Kim, Jhinhwan Lee, “Direct observation of dynamics of magnetic topological defects in parents compound superconductor Sr₂VO₃FeAs”, Korean Physical Society, (April, 2016).

7. Won-Jun Jang, Howon Kim, Wang Min, Sungkyu Jang, Minwoo Kim, Sungjoo Lee, Sang Woo Kim, Young Jae Song, Se-Jong Kahng, “Observation of unbalanced standing wave patterns at a graphene p-n junction caused by chiral electron reflection”, Korean Physical Society, (October, 2014).

6. Won-Jun Jang, Eui-Sup Lee, Howom Kim, JongKeon Yoon, Yunhee Chang, Yong-Hyun Kim, Se-Jong Kahng, “Local Electronic Structures of Graphene Probed by Scanning Tunneling Spectroscopy”, Korean Vacuum Society, (August, 2013).

5. Won-Jun Jang, Jong Keon Yoon, Jeong Heum Jeon, Se-Jong Kahng, “Local Electronic Structures of Graphene on Ru(0001): Scanning Tunneling Spectroscopy Study”, Korean Physical Society, (October, 2011).

4. Won-Jun Jang, Jong Keon Yoon, Jeong Heum Jeon, Se-Jong Kahng, “Electronic Structures of Graphene Intercalated by Oxygen on Ru(0001): Scanning Tunneling Spectroscopy Study”, Korean Vacuum Society, (August, 2011).
3. Won-Jun Jang, Jeong Heum Jeon, Jong Keon Yoon, Se-Jong Kahng, “Electronic Structures of Graphene on Ru(0001): Scanning Tunneling Spectroscopy Study”, Korean Physical Society, (April, 2011).
2. Won-Jun Jang, Jong Keon Yoon, Howon Kim, Se-Jong Kahng, “Electronic structure of graphene on Ru(0001) : STM and STS study”, Asian Workshop on Surface Nano-Science, (January, 2011).
1. Won-Jun Jang, Jong Keon Yoon, Howon Kim, Se-Jong Kahng, “Modified Electronic Structure of Distorted Graphene on Ru(0001): STM and STS Study”, Korean Physical Society, (April, 2010).

References

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