



Keehoon Kang | Curriculum Vitae

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Education

- 2012–2017 **PhD**, *Optoelectronics Group, Department of Physics, University of Cambridge.*
Dissertation title: Pure Spin Current and Charge Transport in Conjugated Polymer
Supervised by Prof. Henning Sirringhaus
- 2011–2012 **MSci**, *Department of Physics, University of Cambridge, First Class Honours.*
Pt III Experimental and Theoretical Physics
- 2008–2011 **B.A.**, *Department of Physics, University of Cambridge, First Class Honours.*
Natural Sciences Course (Pt IA, Pt IB & Pt II) specialised in Experimental and Theoretical Physics

Work Experience

- 2022-present **Assistant Professor**, *Department of Materials Science & Engineering, Seoul National University.*
Principal Investigator of ONE Lab
- 2021–2022 **Assistant Professor**, *Department of Materials Science & Engineering, Yonsei University.*
- 2017– 2021 **Post-doc**, *Department of Physics & Astronomy, Seoul National University.*
Alternative Military Service for 3 years (June 2017– June 2020)
PI: Prof. Takhee Lee
Research Topics: Organic/Inorganic hybrid materials for electronic & optoelectronic devices

Awards & Achievements

- 2023-present **Young Advisory Board Member of InfoMat and InfoScience** .
Elected as an advisory editorial member for participating in academic activities by InfoMat
- 2019 **The 69th Lindau Nobel Laureate Meeting Participant.**
Selected as one of 3 Korean participants *Broadcast on YTN사이언스, "두드림노벨"
- 2019–2020 **TJ Park Science Fellowship** (포스코 청암사이언스 펠로우), *POSCO TJ Park Foundation.*
Research fellowship of KRW 35 million p.a. for 2 years
- 2017 **Young Physicist Prize** (젊은물리학자상), *Korean Physical Society.*
One or two physicists awarded every year in Korean Physical Society Meeting
- 2013–2015 **Senior Scholarship**, *Fitzwilliam College, University of Cambridge.*
Academic achievements in PhD research
- 2012–2017 **Samsung Scholarship** (삼성장학금), *Samsung Scholarship Foundation.*
A full funding for PhD course worth \$50,000 p.a. for 5 years
- 2009–2012 **Skerne Prize**, *St. Catharine's College, University of Cambridge.*
Academic achievements in undergraduate exams
- 2011 **Amalendu Dev Prize**, *Department of Physics, University of Cambridge.*
The top research review project
- 2008–2012 **Kwanjeong Scholarship** (관정장학금), *Kwanjeong Scholarship Foundation* .
a full funding for Undergraduate and Master's course worth \$48,000 p.a. for 4 years
- 2008–2012 **Cambridge Overseas Trust Fellowship**, *University of Cambridge.*
- 2007 **Gold Medal, British Physics Olympiad.**

Research Interests

- ◇ Charge & Spin Transport in Molecular Semiconductors
- ◇ Electrical Doping in Semiconducting Materials
- ◇ Mixed Ionic-Electronic Conductors
- ◇ Organic-/Inorganic Hybrid Electronic Devices

Publications

- Journals (Selected)
1. **K. Kang**[†], S. Watanabe[†], K. Broch, A. Sepe, A. Brown, I. Nasrallah, M. Nikolka, Z. Fei, M. Heeney, D. Matsumoto, K. Marumoto, H. Tanaka, S.-I. Kuroda and H. Sirringhaus* "2D Coherent Charge Transport in Highly Ordered Conducting Polymers Doped by Solid State Diffusion" *Nature Materials*. **15**, 896-902 (2016)
 2. S. Watanabe[†], K. Ando[†], **K. Kang**, S. Mooser, Y. Vaynzof, H. Kurebayashi, E. Saitoh and H. Sirringhaus, "Polaron Spin Current Transport in Organic Semiconductor" *Nature Physics*. **10**, 308-313 (2014)
 3. Y. Kim, S. Chung, K. Cho, D. Harkin, W.-T. Hwang, D. Yoo, J.-K. Kim, W. Lee, Y. Song, H. Ahn, Y. Hong, H. Sirringhaus, **K. Kang*** and T. Lee*, "Enhanced Charge Injection Properties of Organic Field-Effect Transistor by Molecular Implantation Doping" *Advanced Materials* **31**, 1806697 (2019) -Inside Cover*
 4. Y. Kim, K. Broch, W. Lee, H. Ahn, J. Lee, D. Yoo, J. Kim, S. Chung, H. Sirringhaus, **K. Kang*** and T. Lee*, "Highly Stable Contact Doping in Organic Field-Effect Transistors by Dopant-Blockade Method" *Advanced Functional Materials* **30**, 2000058 (2020)
 5. J.-K. Kim[†], K. Cho[†], J. Jang, K.-Y. Baek, J. Kim, J. Seo, M. Song, J. Shin, J. Kim, S. S. P. Parkin, J.-H. Lee*, **K. Kang*** and T. Lee*, "Molecular Dopant-dependent Charge Transport in Surface Charge Transfer Doped WSe₂ Field Effect Transistors" *Advanced Materials* **33**, 2101598 (2021)
 6. J. Jang[†], J.-K. Kim[†], J. Shin, J. Kim, K.-Y. Baek, J. Park, S. Park, Y. D. Kim, S. S. P. Parkin, **K. Kang***, K. Cho*, and T. Lee*, "Reduced Dopant-Induced-Scattering in Remote Charge Transfer Doped MoS₂ Field-Effect Transistors" *Science Advances* **8**, 38, eabn3181 (2022)
 7. K.-Y. Baek[†], W. Lee[†], J. Lee, J. Kim, H. Ahn, J. I. Kim, J. Kim, H. Lim, J. Shin, Y.-J. Ko, H.-D. Lee, R. H. Friend, T.-W. Lee*, J. Lee*, **K. Kang***, and T. Lee*, "Mechanochemistry-Driven Engineering of 0D/3D Heterostructure for Designing Highly Luminescent Cs–Pb–Br Perovskites", *Nature Communications*. **13**, 4263 (2022) - Featured in Editor's Focus Session [Link]
 8. **K. Kang**^{†*}, H. Ahn[†], Y. Song, W. Lee, J. Kim, Y. Kim, D. Yoo and T. Lee*, "High-Performance Solution-Processed Organo-Metal Halide Perovskite Unipolar Resistive Memory Devices in a Cross-bar Array Structure" *Advanced Materials* **31**, 1804841 (2019) -Front Cover*
 9. J. Lee, K.-Y. Baek, J. Lee, H. Ahn, Y. Kim, H. Lim, Y. Kim, J. Woo, S. D. Stranks, S. K. Lee, H. Sirringhaus, **K. Kang*** and T. Lee*, "Bulk Incorporation of Molecular Dopants into Ruddlesden–Popper Organic Metal–Halide Perovskites for Charge Transfer Doping" *Advanced Functional Materials* **33**, 38 2302048 (2023)
 10. Y. Kim[†], J. Woo[†], Y. K. Jung[†], H. Ahn, I. Kim, Y. Reo, H. Lim, C. Lee, J. Lee, Y. Kim, H. Choi, M.-H. L, J. Lee, S. D. Stranks, H. Sirringhaus, Y.-Y. Noh*, **K. Kang*** and T. Lee*, "Reversible oxidative p-doping in 2D tin halide perovskite field-effect transistors" *ACS Energy Letters*, **9**, 1725-1734 (2024)

- Journals (Others) 27. J. Park, J. G. Jang, **K. Kang**, S. H. Kim, J. Kwak, "High Thermoelectric Performance in Solution-Processed Semicrystalline PEDOT: PSS Films by Strong Acid–Base Treatment: Limitations and Potential" *Adv. Sci.*, 2308368 (2024)
26. S. E. Yoon, Y. Kang, J. Im, J. Lee, S. Y. Lee, J. Park, Y. J. Gao, D. Jeon, J. Y. Son, J. Kim, C. J. Kousseff, T. Kim, H. Seo, **K. Kang**, I. McCulloch, S. K. Kwak, H. H. Choi, B.-G. Kim, J. H. Kim, "Enhancing dopant diffusion for ultrahigh electrical conductivity and efficient thermoelectric conversion in conjugated polymers" *Joule*, 7, 10 (2023)
25. Y. Kim, H. Choi, J. Lee, Y.-K. Jung, J. Jung, J. Cho, T. Lee*, **K. Kang***, "Unlocking the potential of metal halide perovskite thermoelectrics through electrical doping: A critical review" *EcoMat*, e12406 (2023)
24. X. Shen†, **K. Kang†**, Z. Yu, W. H. Jeong, H. Choi, S. H. Park, S. D. Stranks*, H. J. Snaith*, R. H. Friend* and B. R. Lee*, "Passivation strategies for mitigating defect challenges in halide perovskite light-emitting diodes" *Joule* 7(2), 272–308 (2023)-Selected as Front Cover*
23. T. H. Kim, J. H. Kim and **K. Kang***, "Molecular doping principles in organic electronics: fundamentals and recent progress" *Jpn. J. Appl. Phys.* 62 SE0803 (2023)
22. C. Chen, I. E. Jacobs*, **K. Kang**, Y. Lin, C. Jellett, B. Kang, S. B. Lee, Y. Huang, M. BaloochQarai, R. Ghosh, M. Statz, W. Wood, X. Ren, D. Tjhe, Y. Sun, X. She, Y. Hu, L. Jiang, F. C. Spano, I. McCulloch and H. Sirringhaus*, "Observation of Weak Counterion Size Dependence of Thermoelectric Transport in Ion Exchange Doped Conducting Polymers Across a Wide Range of Conductivities" *Adv. Energy. Mater.* 2202797 (2023)
21. C. Chen, I. E. Jacobs, C. Jellett, X. Jiao, J. F. Ponder, B. Kang, S. B. Lee, Y. Huang, L. Zhang, N. Statz, Y. Sun, Y. Lin, **K. Kang**, X. She, Y. Hu, T. Zhang, L. Jiang, C. R. McNeill, I. McCulloch, H. Sirringhaus, "Single Atom Selenium Substitution-Mediated P-Type Doping in Polythiophenes toward High-Performance Organic Electronics and Thermoelectrics" *Adv. Electron. Mater.* 2200053 (2022)
20. M. Wang, T. Wang, O. S. Ojambati, T. J. Duffin, **K. Kang**, T. Lee*, E. Scheer*, D. Xiang* and C. A. Nijhuis*, "Plasmonic phenomena in molecular junctions: Principles and applications" *Nature Review Chemistry* 6,10, 681-704 (2022)
10. C. Lee†, J. Kim†, J. Lee, W. Lee, M. Song, K.-Y. Baek, J. Shin, J. Nam, J. Lee, **K. Kang*** and T. Lee*, "Photo-Responsive Molecular Junctions Activated by Perovskite/Graphene Heterostructure Electrode" *Adv. Opt. Mater.* 10, 11 2200049 (2022)-Selected as Front Cover*
19. S. Youn†, J. Kim†, H. Moon, J.-K. Kim, J. Jang, J. Chang, T. Lee, **K. Kang***, W. Lee*, "Enhanced Thermoelectric Power Factor in Carrier-Type-Controlled Platinum Diselenide Nanosheets by Molecular Charge-Transfer Doping" *Small* 2200818 (2022)
18. J. Kim, K. Cho, J. Pak, W. Lee, J. Seo, J.-K. Kim, J. Shin, J. Jang, K.-Y. Baek, J. Lee, S. Chung, **K. Kang*** and T. Lee* "Channel-Length-Modulated Avalanche Multiplication in Ambipolar WSe₂ Field-Effect Transistors" *ACS Nano* 16, 4, 5376 (2022)
15. Z. Yu†, W. H. Jeong†, **K. Kang†**, H. Song, X. Shen, H. Ahn, S. W. Lee, X. Fan, J. W. Jang, S. R. Ha, J. W. Min, J. H. Park, J. Han, E. D. Jung, M. H. Song, D. W. Chang, W. B. Im, S. H. Park, H. Choi* and B. R. Lee* "Polymer/Small-Molecule Binary-Blend Hole Transport Layer for Enhancing Charge Balance in Blue Perovskite Light Emitting Diodes" *J. of Mater. Chem. A* 10, 13928 (2022)
17. H. Ahn†, **K. Kang†***, Y. Song, W. Lee, J.-K. Kim, J. Lee, K.-Y. Baek, J. Shin, H. Lim, Y. Kim, J. S. Lee*, and T. Lee*, "Resistive Switching by Percolative Conducting Filaments in Organometal Perovskite Unipolar Memory Devices Analyzed Using Current Noise Spectra" *Advanced Functional Materials*, 2107727 (2021)
16. J. Shin, K.-Y. Baek, J. Lee, W. Lee, J. Kim, J. Jang, J. Park, **K. Kang***, K. Cho* and T. Lee* "Proton irradiation effects on mechanochemically synthesized and flash-evaporated hybrid organic–inorganic lead halide perovskites" *Nanotechnology* 33, 6 065706 (2021)
15. J. Seo, J. H. Lee, J. Pak, K. Cho, J.-K. Kim, J. Kim, J. Jang, H. Ahn, S. C. Lim, S. Chung, **K. Kang*** and T. Lee* "Ultrasensitive Photodetection in MoS₂ Avalanche Phototransistors" *Advanced Science* 8, 2102437 (2021)

- Journals (Others)
14. J. Kim, W. Lee, K. Cho, H. Ahn, J. Lee, K.-Y. Baek, J.-K. Kim, **K. Kang*** and T. Lee* "Crystallinity-dependent device characteristics of polycrystalline 2D $n = 4$ Ruddlesden-Popper perovskite photodetectors" *Nanotechnology* **32**, 185203 (2021)
 13. J. Lee[†], W. Lee[†], J. Lee, K.-Y. Baek, J. Shin, J.-K. Kim, J. Kim, H. Ahn, **K. Kang*** and T. Lee* "Tailored Design-of-Experiments Approach for Device Performance Prediction and Optimization of Flash-Evaporated Organic-Inorganic Halide Perovskite-Based Photodetectors" *Adv. Mater. Technol.* **2001131** (2021) -Selected as Back Cover*
 12. J. Lee, W. Lee, **K. Kang***, T. Lee*, S. Lee* "Layer-by-layer Structural Identification of 2D Ruddlesden-Popper Hybrid Lead Iodide Perovskites by Solid-State NMR Spectroscopy" *Chem. Mater.* **33**, 1, 370 (2020)
 11. W. Lee[†], J. Lee[†], H.-D. Lee, J. Kim, H. Ahn, Y. Kim, D. Yoo, J. Lee, T.-W. Lee, **K. Kang*** and T. Lee*, "Controllable deposition of organic metal halide perovskite films with wafer-scale uniformity by single source flash evaporation" *Sci. Rep.* **10**, 18781 (2020)
 10. Y. Liu, Z. Yu, S. Chen, J. H. Park, E. D. Jung, S. Lee, **K. Kang**, S.-J. Ko, J. Lim, M. H. Song, B. Xu, H. J. Snaith, S. H. Park, B. R. Lee "Boosting the Efficiency of Quasi-2D Perovskites Light-emitting Diodes by Using Encapsulation Growth Method" *Nano Energy* **80**, 1055111(2021)
 9. Z. Zhao, W. Wang, X. Zhou, L. Ni, **K. Kang**, T. Lee, H. Han, H. Yuan, C. Guo, M. Wang, M. J. Ko, Y. Li, and D. Xiang "Crystal Size Effect on Carrier Transport of Microscale Perovskite Junctions via Soft Contact" *Nano Letters* **20**, 12, 8640–8646 (2020)
 8. D. Yoo, **K. Kang**, Y. Kim, H. Ahn, W. Lee, J. Pak, S. Chung, and T. Lee "Solution-Processed Transparent Superhydrophobic Protection Layers for Enhancing the Device Reliability of Flexible Organic Optoelectronics" *Adv. Mater. Technol.* **202000449** (2020)
 7. J. Pak, I. Lee, K. Cho, J.-K. Kim, H. Jeong, W.-T. Hwang, G. H. Ahn, **K. Kang**, W. J. Yu, A. Javey, S. Chung and T. Lee, "Intrinsic Optoelectronic Characteristics of MoS₂ Phototransistors via a Fully Transparent van der Waals Heterostructure" *ACS Nano* **13**, 8, 9638-9646 (2019)
 6. S.-J. Wang, D. Venkateshvaran, M. R. Mahani, U. Chopra, E. R. McNellis, R. Di Pietro, S. Schott, A. Wittmann, G. Schweicher, M. Cubukcu, **K. Kang**, R. Carey, T. Wagner, J. N. M. Siebrecht, D. P. G. H Wong, I. E. Jacobs, R. O. Aboljadayel, A. Ionescu, S. A. Ergorov, S. Mueller, O. Zadvorna, P. Skalski, C. Jellett, M. Little, A. Marks, I. McCulloch, J. Wunderlich, J. Sinova and H. Sirringhaus "Long-Range and Fast Exchange-Enhanced Lateral Spin Transport in Doped Conjugated Polymers" *Nature Electronics* **2**, 98 (2019) -Front Cover*
 5. **K. Kang***, S. Schott, D. Venkateshvaran, K. Broch, G. Schweicher, D. Harkin, C. Jellett, C. B. Nielsen, I. McCulloch and H. Sirringhaus*, "Investigation of the Thermoelectric Response in Conducting Polymers Doped by Solid-State Diffusion" *Mater. Today. Phys.* **8**, 112-122 (2019)
 4. J. Koo, Y. Jang, L. Martin, D. Kim, H. Jeong, **K. Kang**, W. Lee, J. Kim, W.-T. Hwang, D. Xiang, E. Scheer, M. Kabdulov, T. Huhn, F. Pauly and T. Lee, "Unidirectional Real-Time Photoswitching of Diarylethene Molecular Junctions with Multilayer Graphene Electrodes" *ACS Appl. Mater. Interfaces* **11**, 11645 (2019)
 3. W. Lee, Y. Kim, Y. Song, K. Cho, D. Yoo, H. Ahn, **K. Kang*** and T. Lee*, "Investigation of Time-Dependent Resistive Switching Behaviors of Unipolar Non-Volatile Organic Memory Devices" *Advanced Functional Materials* **28**, 1801162 (2018) -Back Cover*
 2. K. Cho, J. Park, J. Kim, **K. Kang**, T.-Y. Kim, J. Shin, B. Y. Choi, S. Chung and T. Lee "Contact-Engineered Electrical Properties of MoS₂ Field-Effect Transistors via Selectively Deposited Thiol-Molecules" *Advanced Materials* **30**, 1705540 (2018) -Inside Cover*
 1. T. Tashiro, A. Nomura, S. Matsuura, S. Watanabe, **K. Kang**, H. Sirringhaus and K. Ando, "Spin-Current Emission Governed by Nonlinear Spin Dynamics" *Scientific Reports* **5**, 15158 (2015)

Commentary **K. Kang*** & T. Lee* "Molecular Junction Refrigerator: Peltier cooling at molecular scale"
Nature Nanotechnology. 13, 97-99 (2018), *News & Views*

*corresponding author †co-first author

* Cover Gallery



Patents

- USA
1. T. Lee, Y. Kim, **K. Kang**, "ORGANIC SEMICONDUCTOR TRANSISTOR ",
USA Patent, Issued, Patent No.: 10707421 , Issued on: July 07, 2020
 2. T. Lee, Y. Kim, **K. Kang**, "METHOD FOR MANUFACTURING ORGANIC SEMICONDUCTOR TRANSISTOR", *USA Patent, Issued*, Patent No.: 10693069 , Issued on: June 23, 2020
- Korean
1. 이택희, 김영록, **강기훈**, "유기 반도체 트랜지스터 제조방법",
출원번호: 10-2019-0037002, 출원일: 2019.03.29
 2. 이택희, 김영록, **강기훈**, "유기 반도체 트랜지스터",
출원번호: 10-2019-0036999, 출원일: 2019.03.29
 3. 이택희, 김영록, **강기훈**, "유기 반도체 박막에서의 도판트 분자 확산 억제 방법",
출원번호: 10-2019-0037001, 출원일: 2019.03.29

Review Activity

- Journals Served as a reviewer for *Nature Electronics*, *Nature Communications*, *Advanced Materials*, *Journal of American Chemical Society*, *Nano Letters*, *Angewandte Chemie*, *Advanced Science*, *Journal of Materials Chemistry C*, *Advanced Electronic Materials*, *SmartMat*, *NanoSelect*, *ACS Applied Energy Materials*, *ChemPhysChem*, *Heliyon*
- Conferences
- *PIERS 2024, Chengdu (China) Apr 2024
 - *ICAMD 2023, Jeju (Korea) Dec 2023
 - *EMP 2023, Singapore Aug 2023
 - *EMRS Sping 2023, Strasbourg (France) May 2023
 - *AsiaNANO 2022, Busan (Korea) November 2022
 - *ICFPE 2022, Jeju (Korea) October 2022
 - *The Polymer Society (한국고분자학회), Daegu (Korea) October 2022
 - *MCARE 2022, Busan (Korea) August 2022
 - *KIM (한국금속재료학회 융합재료분과) 신진연구자워크샵, Busan (Korea) January 2022
 - *KFPE (한국인쇄전자학회), Hoengseong (Korea) December 2021,
 - *The Polymer Society (한국고분자학회), Gyeongju (Korea) October 2021,
 - *KPS Spring Meeting (한국물리학회), Online Conference, April 2021
 - Materials Research Society Spring Meeting, Boston (US), Nov 2023
 - Materials Research Society Spring Meeting, San Francisco (US), April 2023

Conferences **ICSM**, Glasgow (UK), July 2022

Materials Research Society Spring Meeting, Hawaii (US), May 2022

Materials Research Society Fall Meeting, Boston (US), December 2020

Materials Research Society Fall Meeting, Boston (US), December 2019

E-MRS Spring Meeting (2 talks), Nice (France), May 2019

KPS Spring Meeting, Daejeon (Korea), May 2019

KCS 2019, Korea, February 2019

ICSM 2018, Busan (Korea), July 2018

The 60th EMC Meeting, Santa Barbara (US), June 2018

ICME&D, Daegu (Korea), May 2018

***KPS Fall Meeting**, Gyeongju (Korea), October 2017 [한국물리학회 젊은물리학자상 초청강연]

Materials Research Society Fall Meeting, Boston (US), November 2016

European Physical Society Meeting: CMD26, Groningen (Netherlands), September 2016

American Physical Society March Meeting, San Antonio (US), March 2015

Cavendish Graduate Conference, Cambridge (UK), December 2014

Spintech VII International Conference, Chicago (US), July 2013

*Invited talk

References

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