Curriculum Vitae

Sung Wng Kim

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EDUCATION

- B.S. in Metallurgical Engineering, Chonnam National University, Korea. Feb. 1998
- M.S. in Material Science and Engineering, Chonnam National University, Korea. Feb. 2000
- Ph.D. in Material Physics, Tokyo Institute of Technology, Japan, Sep. 2003

RESEARCH INTERESTS

- Material Science; Condensed Matter Physics; Inorganic Chemistry;
- Quantum Materials; 2D vdW Materials; Topological Materials; Electride Materials; Energy Materials;
- Thermoelectric Materials; Electrochemical Catalysts; Hydrogen Ion Conductors;
- 2D Electron Gas/Liquid; Dirac/Weyl Fermions; Superconductivity;
- Electron Phases; Wigner Crystal; Single Electron; Electron-by-electron Manipulation; Qubits

TRAINING

1998–2000 (M.S. research)	Conducted research in powder metallurgy and thermoelectric materials on transition metal silicides such as $FeSi_2$ and CoSi under the guidance of Professor Dap Chun Choi at Chonnam National University.
2000–2003 (Ph. D. research)	Conducted research in high performance thermoelectric materials on half-Heusler and skutterudite compounds for high temperature applications under the guidance of Professor Yoshinao Mishima at Tokyo Institute of Technology.
2003–2006 (Postdoc research)	Developed room-temperature stable Mayenite electride and elucidated its metallic and superconducting properties through novel synthetic processes; conducted single crystal growth of iron arsenide superconductor; initiated thermoelectric two-dimensional electron gas under the guidance of Professor Hideo Hosono at Japan Science and Technology Agency and Tokyo Institute of Technology.

POSITIONS

2003–2004	Postdoctoral Researcher, Exploratory Research for Advanced Technology (ERATO), Japan Science and Technology Agency (JST), Japan (Advisor: Prof. Hideo Hosono)
2004–2008	Researcher, Frontier Research Center, Tokyo Institute of Technology, Japan (Advisor: Prof. Hideo Hosono)
2008–2009	Assistant Professor, Materials and Structures Laboratory, Tokyo Institute of Technology, Japan
2009–2012	Associate Professor, Frontier Research Center, Tokyo Institute of Technology, Japan

2010–2011	Visiting Researcher, RIKEN Spring-8 Center, Japan
2012–2016	Associate Professor, Department of Energy Science, Sungkyunkwan University, Korea
2016–2018	Dean, Department of Energy Science, Sungkyunkwan University, Korea
2016–2026	Professor, Department of Energy (Science), Sungkyunkwan University, Korea
2016–2026	Director, Center for Electride Materials, Sungkyunkwan University, Korea
2017–2019	Director, Center for Nanotube and Nanostructure, Sungkyunkwan University, Korea
2018–2019	Visiting Scholar, Lawrence Berkeley National Laboratory, Berkeley, CA, USA
2018–2021	Project Leader, Exploratory Project, IBS Center for Integrated Nanostructure Physics, Sungkyunkwan University, Korea
2025–2026	Director, Institute of New Paradigm of Energy Science Convergence, Sungkyunkwan University, Korea
2025–2026	Dean, Department of Energy Science, Sungkyunkwan University, Korea
2025–2026	Visiting Scholar, Department of Material Science and Engineering, UC Berkeley, CA, USA
2026–present	Professor, Department of Materials Science and Engineering, Pohang University of Science and Technology, Korea

HONORS AND AWARDS

Jun. 2016	Science and Technology Award of the Month (*Physics*), Ministry of Science and ICT, Government of Korea
Mar. 2016	SKKU Young Fellow, Sungkyunkwan University
Apr. 2020	The 26th Human tech Paper Award (*Grand Prize*) Samsung Electronics
Jan. 2021	2021 SKKU Excellence Research Award, Sungkyunkwan University
Jan. 2021	S-oil next generation scientist (*Physics*), Korea Academy of Science and Technology
Jan. 2022	2022 SKKU Excellence Research Award, Sungkyunkwan University
Jan. 2023	2023 SKKU Excellence Research Award, Sungkyunkwan University

OTHER SERVUCE AND ACTIVITIES

2017–2026	Founder, CEO, Thermoelectric Total Solutions (Invested by POSCO)
2022–2026	External Auditor Director, CY AUTOTECH
2022–2024	Technical Director, The Korean Institute of Metals and Materials
2014–present	Organizing committee, 1st, 2nd, 3rd, 4th and 5th Functional Materials Symposium
2018	Organizing committee, The 5th Internation conference on electronic materials and nanotechnology for green environment

PUBLICATIONS (SELECTED RECORDS AND ROLE)

1. “Topological Fermi-arc surface state covered by floating electrons on a two-dimensional electride”, *Nature Communications*, 15, 5615 (2024). Corresponding Author.

2. “Negatively charged platinum nanoparticles on dititanium oxide electride for ultra-durable electrocatalytic oxygen reduction”, *Energy & Environmental Science*, 16, 4464–4473 (2023). Corresponding Author.

3. “Magnetic quasi-atomic electrons driven reversible structural and magnetic transitions between electride and its hydrides”, *Nature Communications*, 14, 5469 (2023). Corresponding Author.

4. “Quantum electron liquid and its possible phase transition”, *Nature Materials*, 21, 1269–1274 (2022). Corresponding Author.

5. “Non-oxidized bare copper nanoparticles with surface excess electrons in air”, *Nature Nanotechnology*, 17, 285–291 (2022). Corresponding Author.

6. “Real-space imaging and control of chiral anomaly-induced current at room temperature in topological Dirac semimetal”, *Science Advances*, 8, eabq2479 (2022). Corresponding Author.

7. “Coexistence of surface superconducting and three-dimensional topological Dirac states in semimetal KZnBi”, *Physical Review X*, 11, 021065 (2021). Corresponding Author.

8. “Water-and acid-stable self-passivated dihafnium sulfide electride and its persistent electrocatalytic reaction”, *Science Advances*, 6, eaba7416 (2020). Corresponding Author.

9. “Ferromagnetic quasi-atomic electrons in two-dimensional electride”, *Nature Communications*, 11, 1526 (2020). Corresponding Author.

10. “Creation of two-dimensional layered Zintl phase by dimensional manipulation of crystal structure”, *Science Advances*, 5, eaax0390 (2019). Corresponding Author.

11. “Structural and quantum-state phase transition in van der Waals layered materials”, *Nature Physics*, 13, 931–937 (2017). Corresponding Author.

12. “Phase Patterning for Ohmic Homojunction Contact in $MoTe_2$”, *Science*, 349, 625–628 (2015). Corresponding Author.

13. “Dense dislocation arrays embedded in grain boundaries for high-performance bulk thermoelectrics”, *Science*, 348, 109–114 (2015). Corresponding Author.

14. “Bandgap opening in few-layered monoclinic $MoTe_2$“, *Nature Physics*, 11, 482–486 (2015). Corresponding Author.

15. “Hydrotrifluoromethylation of aromatic alkenes and alkynes using an inorganic electride $[Ca_2N]^+ \cdot e^-$ as a radical generator”, *Nature Communications*, 5, 4881 (2014). Corresponding Author.

16. “Dicalcium nitride as a two-dimensional electride with an anionic electron layer”, *Nature*, 494, 336–340 (2013). Co-author (Initiator & Teaching first author).

17. “Ammonia synthesis using a stable electride as an electron donor and reversible hydrogen store”, *Nature Chemistry,* 4, 934–940 (2012). Co-author (Teaching first author).

18. “Two-dome structure in electron-doped iron arsenide superconductors”, *Nature Communications*, 3, 943 (2012). Co-author (Teaching first author).

19. “Solvated electrons in high-temperature melts and glasses of the room-temperature stable electride $[Ca_{24}Al_{28}O_{64}]^{4+}\cdot 4e^{-}$”, *Science*, 333, 71–74 (2011). First Author.

20. “Giant thermoelectric Seebeck coefficient of a two-dimensional electron gas in $SrTiO_3$“, *Nature Materials*, 6, 129–134 (2007). Co-author (Initiator)

PUBLICATIONS (FULL RECORDS)

1. “Direct imaging and spatial manipulation of single electrons on two-dimensional hydride surface”, Min-Seok Kim, Dong Cheol Lim, Woo-Yong Kim, Sang Yong Song, Heejeong Koo, Yeongkwan Kim*, Jungpil Seo*, Sung Wng Kim*, ***Science (Under Revision)***

2. “Ultrastable one-dimensional electride support for an efficient and durable bifunctional electrocatalyst”, Siyuan Ren, Kyoung Ryeol Park, Binod Regmi, Wooseon Choi, Yun Seong Cho, Seon Je Kim, Heechae Choi, Young-Min Kim, Jaeyeong Kim, Joohoon Kang, HyukSu Han, Seong-Gon Kim, Sung Wng Kim*, ***Carbon Energy (In Press)***

3. “Polymorphic YTiGe intermetallic electride created by hydrogenation and dehydrogenation”, Shuhao Chen, Siyuan Ren, Md Salman Khan, Dong Cheol Lim, Nahyun Lee, Thu-Thuy Hoang, Junheok Bang, and Sung Wng Kim*, ***Chemistry of Materials,*** 2025 Feb;37:1600-1608

4. “Permanent electride magnets induced by quasi-atomic non-nucleus-bound electrons”, Jeong Yun Hwang, Seung Yong Lee, Kimoon Lee, Binod Regmi, Nahyun Lee, Dong Cheol Lim, Heejeong Koo, Wooyoung Lee, Seong-Gon Kim, Sung Wng Kim*, and Kyu Hyoung Lee*, ***Advanced Materials,*** 2025 Feb;19:2412956

5. “Progressive control of Rashba state on topological Dirac semimetal KZnBi”, Gyubin Lee, Jahyun Koo, Yeonghoon Lee, Jaehun Cha, Jounghoon Hyun, Kimoon Han, Chan-young Lim, Jonathan D. Denlinger, Sunghun Kim, Sung Wng Kim*, Yeongkwan Kim*, ***Nano Letters,*** 2024 Oct;24:13727-13732

6. “Topological Fermi-arc surface state covered by floating electrons on a two-dimensional electride”, Chan-young Lim, Min-Seok Kim, Dong Cheol Lim, Sunghun Kim, Yeonghoon Lee, Jaehoon Cha, Gyubin Lee, Sang Yong Song, Dinesh Thapa, Jonathan D. Denlinger, Seong-Gon Kim, Sung Wng Kim*, Jungpil Seo*, Yeongkwan Kim*, ***Nature Communications,*** 2024 Jul;15:5615

7. “Pressure-Dependent Superconductivity in Topological Dirac Semimetal SrCuBi”, Nahyun Lee, Cuiying Pei, Jahyun Koo, Yanpeng Qi*, Sung Wng Kim*, ***Advanced Materials,*** 2024 May;36:2400428

8. “Strongly correlated electron system $NiWO_4$: A new family of materials for triboelectrics using inherent Coulombic repulsion”, Gi Hyeon Han, Sang Jeong Park, Gi Hyun Park, Chul Oh Park, Heejun Lee, Jae Won Lee, Joonho Bang, Kimoon Lee, Dong Won Chun, Sung Wng Kim*, Seung Yong Lee*, Kyu Hyoung Lee*, ***Nano Energy***, 2024 Jul;126:109595

9. “Magnetic quasi-atomic electrons driven reversible structural and magnetic transitions between electride and its hydrides”, Seung Yong Lee, Dong Cheol Lim, Md Salman Khan, Jeong Yun Hwang, Hyung Sub Kim, Kyu Hyung Lee*, Sung Wng Kim*, ***Nature Communications,*** 2023 Sep;14:5469

10. “Negatively charged platinum nanoclusters on dititanium oxide electride for efficient and ultra-durable electrocatalytic oxygen reduction”, Erbing Hua, Seunggun Choi, Siyuan Ren, Seon Je Kim, Woo-Sung Jang, Soyun Joo, Jingshu Zhang, Taeseup Song, Seungbum Hong, Young-Min Kim, Hyuksu Han*, and Sung Wng Kim*, ***Energy & Environmental Science***, 2023 Aug;16(10):4464-4473

11. “Atomic site-targeted doping in $Ti_2FeNiSb_2$ double half-Heusler alloys: zT improvement via selective band engineering and point defect scattering”, Rahidul Hasan, Seungki Jo, Wei Shi, Seung Yong Lee, Won-Seon Seo, Vaskuri C. S. Theja, Roy A. L. Vellaisam, Kyung Tae Kim, Sang-il Kim, Sung Wng Kim*, Hyun-Sik Kim* and Kyu Hyoung Lee*, ***Journal of Alloys and Compounds,*** 2023 Mar;938:168572

12. “Real-space imaging and control of chiral anomaly-induced current at room temperature in topological Dirac semimetal”, Byung Cheol Park, Taewoo Ha, Kyung Ik Sim, Taek Sun Jung, Jae Hoon Kim,

Yeongkwan Kim, Young Hee Lee, Teun-Teun Kim, and Sung Wng Kim*, ***Science Advances,*** 2022 Nov;8(47):eabq2479

13. “Boosted Heterogeneous Catalysis by Surface-Accumulated Excess Electrons of Non-Oxidized Bare Copper Nanoparticles on Electride Support”, Sung Su Han, Athira Thacharon, Jun Kim, Kyungwha Chung, Xinghui Liu, Woo-Sung Jang, Albina Jetybayeva, Seungbum Hong, Kyu Hyoung Lee, Young-Min Kim, Eun Jin Cho*, and Sung Wng Kim*, ***Advanced Science,*** 2022 Nov;10(2):2204248

14. “Quantum electron liquid and its possible phase transition”, Sunghun Kim, Joonho Bang, Chan-young Lim, Seung Yong Lee, Jounghoon Hyun, Gyubin Lee, Yeonghoon Lee, Jonathan D. Denlinger, Soonsang Huh, Changyoung Kim, Seong-Gon Kim, Young Hee Lee, Yeongkwan Kim*, and Sung Wng Kim*, ***Nature Material***, 2022 Sep;21(11):1269-1274

15. “Non-oxidized bare metal nanoparticles in air: A rational approach for large-scale synthesis via wet chemical process”, Athira Thacharon, Woo-Sung Jang, Jihyun Kim, Joohoon Kang, Young-Min Kim, and Sung Wng Kim*, ***Advanced Science***, 2022 Jul;9(26):2201756

16. “Identifying the correlation between structural parameters and anisotropic magnetic properties in I-Mn-V semiconductors: A possible room-temperature magnetism”, Byung IL Yoo, Nahyun Lee, Bipin Lamichhane, Joonho Bang, Hyun Yong Song, Byung Cheol Park, Kyu Hyoung Lee, Seong-Gon Kim, and Sung Wng Kim*, ***Advanced Materials,*** 2022 Jul;34(33):2200074

17. “Chemically stable low-dimensional electrides in transition metal-rich monochalcogenides: Theoretical and experimental explorations”, Se Hwang Kang, Dinesh Thapa, Binod Regmi, Siyuan Ren, Young-Min Kim, Seong-Gon Kim, and Sung Wng Kim*, ***Journal of American Chemical Society,*** 2022 Mar;144(10):4496-4506

18. “Non-oxidized bare copper nanoparticles with surface excess electrons in air”, Kyungwha Chung, Joonho Bang, Athira Thacharon, Hyun Yong Song, Se Hwang Kang, Woo-Sung Jang, Neha Dhull, Dinesh Thapa, C. Muhammed Ajmal, Bumsub Song, Sung-Gyu Lee, Zhen Wang, Albina Jetybayeva, Seungbum Hong, Kyu Hyoung Lee, Eun Jin Cho, Seunghyun Baik, Sang Ho Oh, Young-Min Kim, Young Hee Lee, Seong-Gon Kim*, Sung Wng Kim*, ***Nature Nanotechnology,*** 2022 Mar;17(3):285-291

19. "Reshaped Weyl fermionic dispersions driven by Coulomb interactions in $MoTe_2$" Seoung-Hun Kang, Sangjun Jeon, Hyun-Jung Kim, Wonhee Ko, Suyeon Cho, Se Hwang Kang, Sung Wng Kim, Heejun Yang, Hyo Won Kim, and Young-Woo Son*, ***Physical Review B,*** 2022 Jan;105(4):045143

20. "Boosting photoredox catalysis using two-dimensional electride as a persistent electron donor" Heo Seunga, Chun Yu Sung, Bang Joonho, Hwang Ho Seong Hwang, Sanju Kim, Sonam kim, Eun Jin Cho*, Sung Wng Kim*, You Youngmin*, ***ACS Applied Materials&Interfaces,*** 2021 Sep;13(36):42880-42888

21. "Tunable Berry curvature and transport crossover in topological Dirac semimetal KZnBi" Junseong Song, Byung Cheol Park, Kyung Ik Sim, Joonho Bang, Sunghun Kim, Zhuo Yang, Yoshimitsu Kohama, Yeongkwan Kim, and Sung Wng Kim*, ***npj Quantum Materials,*** 2021 Dec;6(1):77

22. "Antiperovskite Gd_3SnC: Unusual coexistence of ferromagnetism and heavy fermions in Gd lattice" Joonho Bang, Jongho Park, Kimoon Lee, Minsoo Kim, Wonshik Kyung, Jonathan D. Denlinger, Yeongkwan Kim, Young Hee Lee, Changyoung Kim*, and Sung Wng Kim*, ***Advanced Materials***, 2021 Sep;33(37):2102958

23. "Ti addition effect on the grain structure evolution and thermoelectric transport properties of $Hf_{0.5}Zr_{0.5}NiSn_{0.98}Sb_{0.02}$ half-Heusler Alloy", Junsang Cho, Taegyu Park, Ki Wook Bae, Soon-Mok Choi, Sang-il Kim* and Sung Wng Kim*, ***Materials***, 2021 Jul;14(14):4029

24. "Van der Waals electride: Toward intrinsic two-dimensional ferromagnetism of spin-polarized anionic electrons", Hyun Yong Song, Byung Il Yoo, Jin-Ho Choi, Se-Hwang Kang, Joonho Bang, Wei Li, Chandani N. Nandadasa, Dinesh Thapa, Duhee Yoon, Myung Joon Han, Kyu Hyoung Lee, Seong Gon Kim*, Kimoon Lee*, and Sung Wng Kim*, ***Materials Today Physics***, 2021 Sep;20:100473

25. "Cu nanoparticle-processed n-type $Bi_2Te_{2.7}Se_{0.3}$ alloys for low-temperature thermoelectric power generation", Junsang Cho, Sang-il Kim, Yurian Kim, Hyun-Sik Kim, Taegyu Park*, Sung Wng Kim*, ***Journal of Alloys and Compounds***, 2021 Dec;884:161060

26. "Hidden role of intrinsic Sb-rich nano-precipitates for high-performance $Bi_{2-x}Sb_xTe_3$ thermoelectric alloys", Liangwei Fu, Kyu Hyoung Lee, Sang-Il Kim, Jae-Hong Lim, Wooseon Choi, Yudong Cheng, Min-Wook Oh, Young-Min Kim*, Sung Wng Kim*, ***Acta Materialia,*** 2021 Aug;215:117058

27. "Cumulative defect structures for experimentally-attainable low thermal conductivity in thermoelectric $(Bi,Sb)_2Te_3$ alloys", Kyu Hyoung Lee, Young-Min Kim, Chol Oh Park, Weon Ho Shin, Sung Wng Kim*, Hyun-Sik Kim* and Sang-il Kim*, ***Materials today Energy,*** 2021 Sep;21:100795

28. "High-performance bismuth antimony eelluride thermoelectric membrane on curved and flexible supports", Liangwei Fu, Kwansu Park, Sang-il Kim, Bongju Kim, Hyun Yong Song, Wooseon Choi, Young-Min Kim, Jae-Yeol Hawng*, Kyu Hyoung Lee*, and Sung Wng Kim*, ***ACS Energy Letter,*** 2021 Jul;6(7):2378-2385

29. "Coexistence of surface superconducting and three-dimensional topological Dirac states in semimetal KZnBi", Junseong Song, Sunghun Kim, Youngkuk Kim, Huixia Fu, Jahyun Koo, Zhen Wang, Gyubin Lee, Jouhahn Lee, Sang Ho Oh, Joonho Bang, Taku Matsushita, Wada Nobuo, Hiroki Ikegami, Jonathan D. Denlinger, Young Hee Lee, Binghai Yan*, Yeongkwan Kim*, and Sung Wng Kim*, ***Physical Review X,*** 2021 Jun;11(2):021065

30. "Stoner enhancement from interstitial electrons in Y_2C toward a spontaneous ferromagnetic electride", Chandani N. Nandadasa, Kimoon Lee, Joonho Bang, Jongho Park, Sung Wng Kim*, and Seong-Gon Kim*, ***Dalton Transaction***, 2021 Apr;50(16):5446-5451

31. "Mixed-cation driven magnetic interaction of interstitial electrons for ferrimagnetic two-dimensional electride", Seung Yong Lee, Joonho Bang, Hyun Yong Song, Byung Il Yoo, Yeongkwan Kim, Kimoon Lee, Dinesh Thapa, Seong-Gon Kim and Sung Wng Kim*, ***npj Quantum Material,*** 2021 Dec;6(1):21

32. " Atomic-scale chemical mapping of copper dopants in $Bi_2Te_{2.7}Se_{0.3}$ thermoelectric alloy", Young-Min Kim, Kyu Hyoung Lee, Liangwei Fu, Min-Wook Oh, Sang-Hyeok Yang, Ning Shoucong, Gyeongtak Han, Min Young Kim, Ki-Soo Kim, Myoungho Jeong, Kaeduck Jang, Eunha Lee, Eiji Okunishi, Hidetaka Sawada, Sang-il Kim, Stephen J. Pennycook, Young Hee Lee, and Sung Wng Kim*, ***Materials Today Physics,*** 2021 Mar;17:100347

33. " Weighted mobility ratio engineering for high-performance Bi-Te-based thermoelectric materials via suppression of minority carrier transport", Minyoung Kim, Sang-il Kim, Sung Wng Kim*, Hyun-Sik Kim*, and Kyu Hyoung Lee*, ***Advanced Materials***, 2021 Nov;33(47):2005931

34. " Engineering the electrical and optical properties of graphene oxide via simultaneous alkali metal doping and thermal annealing", Samira Naghdi, Hyun Yong Song, Alejandro Varez, Kyong Yop Rhee*, Sung Wng Kim*, ***Journal of Materials Research and Technology***, 2020 Nov;9(6):15824-15837

35. " The effect of cesium dopant on APCVD graphene coating on copper", Samira Naghdia, Katarina Ne˘sovi´, Gonzalo Sánchez-Arriagaa, Hyun Yong Song, Sung Wng Kim, Kyong Yop Rhee*, Vesna Mi˘skovi´Stankovi´*, ***Journal of Materials Research and Technology***, 2020 Jul;9(5):9798-9812

36. " Symmetry dictated grain boundary state in a two-dimensional topological insulator", Hyo Won Kim*, Seoung-Hun Kang, Hyun-Jung Kim, Kisung Chae, Suyeon Cho, Wonhee Ko, Sangjun Jeon, Se Hwang Kang, Heejun Yang, Sung Wng Kim, Seongjun Park, Sungwoo Hwang, Young-Kyun Kwon and Young-Woo Son*, ***Nano Letters***, 2020 Aug;20(8):5837-5843

37. "Improvement in the thermoelectric performance of highly reproducible n-type $(Bi,Sb)_2Se_3$ alloys by Cl-doping", Nadra Nasir, Kyu Hyoung Lee, Sang-il Kim, Hyun-Sik Kim, Jae-Hong Lim, Liangwei Fu*and Sung Wng Kim*, ***RSC Advances***, 2020 Jun;10(41):24663-24668

38. "Improved carrier transport properties by I-doping in n-type $Cu_{0.008}Bi_2Te_{2.7}Se_{0.3}$ thermoelectric alloys", Kyu Hyoung Lee, Hyun-Sik Kim, Sung-sil Choo, Weon Ho Shin, Jae-Hong Lim, Sung Wng Kim, Sang-il Kim*, ***Scripta Materialia***, 2020 Sep;186:357-361

39. "Important role of Cu in suppressing bipolar conduction in Bi-rich $(Bi,Sb)_2Te_3$", Kyu Hyoung Lee, Weon Ho Shin, Hyun-Sik Kim, Hyun-joon Cho, Sung Wng Kim, Sang-il Kim*, ***Scripta Materialia***, 2020 Sep;186:225-229

40. "Water-and acid-stable self-passivated dihafnium sulfide electride and its persistent electrocatalytic reaction", Se Hwang Kang, Joonho Bang, Kyungwha Chung, Chandani N. Nandadasa, Gyeongtak Han, Subin Lee, Kyu Hyoung Lee, Kimoon Lee, Yanming Ma, Sang Ho Oh, Seong-Gon Kim, Young-Min Kim, Sung Wng Kim*, ***Science Advances***, 2020 Jun;6(23):eaba7416

41. "Ferromagnetic quasi-atomic electrons in two-dimensional electride" Seung Yong Lee, Jae-Yeol Hwang, Jongho Park, Chandani N. Nandadasa, Younghak Kim, Joonho Bang, Kimoon Lee, Kyu Hyoung Lee, Yunwei Zhang, Yanming Ma, Hideo Hosono, Young Hee Lee, Seong-Gon Kim, and Sung Wng Kim*, ***Nature Communications***, 2020 Dec;11(1):1526

42. "Band convergence in thermoelectric materials: Theoretical background and consideration on Bi−Sb−Te alloys", Kyu Hyoung Lee, Sang-il Kim, Hyun-Sik Kim*, and Sung Wng Kim*, ***ACS Applied Energy Materials***, 2020 Mar;3(3):2214-2223

43. "Decisive role of interlayer ionic couplings for the electronic properties of two-dimensional layered electrides", Shuyuan Liu, Wei Li, Sung Wng Kim*, and Jin-Ho Choi*, ***Journal of Physical Chemistry C***, 2020 Jan;124(2):1398-1404

44. "Probing multiphased transition in bulk MoS_2 by direct electron injection", Krishna P. Dhakal, Ganesh Ghimire, Kyungwha Chung, Dinh Loc Duong*, Sung Wng Kim*, and Jeongyong Kim*, ***ACS Nano***, 2019 Dec;13(12):14437-14446

45. "Nanoparticles in $Bi_{0.5}Sb_{1.5}Te_3$: A prerequisite defect structure to scatter the mid-wavelength phonons between Rayleigh and geometry scatterings", Kyu Hyoung Lee, Hyun-Sik Kim, Weon Ho Shin, Se Yun Kim, Jae-Hong Lim, Sung Wng Kim*, and Sang-il Kim*, ***Acta Materialia***, 2020 Feb;185:271-278

46. "Enhanced thermoelectric performance of Cu-incorporated $Bi_{0.5}Sb_{1.5}Te_3$ by melt spinning and spark plasma sintering", Hyun-Jun Cho, Hyun-Sik Kim, Minyoung Kim, Kyu Hyoung Lee, Sung Wng Kim, and Sang-Il Kim*, ***Journal of Electronic Materials***, 2020 May;49(5):2789-2793

47. "Proximity engineering of the van der Waals interaction in multilayered graphene", Sera Kim, Jongho Park, Dinh Loc Duong*, Suyeon Cho*, Sung Wng Kim*, and Heejun Yang*, ***ACS Applied Materials&Interfaces***, 2019 Oct;11:42528-42533

48. "Critical role of atomic-scale defect disorders for high-performance nanostructured half-Heusler thermoelectric alloys and their thermal stability", Ho Jae Lee, Kyu Hyoung Lee, Liangwei Fu, Gyeong Tak Han, Hyun-Sik Kim, Sang-Il Kim, Young-Min Kim, and Sung Wng Kim*, ***Acta Materia****lia*, 2019 Nov;180:97-104

49. "Creation of two-dimensional layered Zintl phase by dimensional manipulation of crystal structure", Junseong Song, Hyun Yong Song, Zhen Wang, Seokhee Lee, Jae-Yeol Hwang, Seung Youb Lee, Jouhahn Lee, Dongwook Kim, Kyu Hyong Lee, Youngkuk Kim, Sang Ho Oh, and Sung Wng Kim*, ***Science Advances***, 2019 Jun;5(6):eaax0390

50. "Cu-incorporation by melt-spinning in n-type $Bi_2Te_{2.7}Se_{0.3}$ alloys for low-temperature power generation", Minyoung Kim, Sang-il Kim, Hyun-joon Cho, Hyuna Mun, Hyun-sik Kim, Jae-Hong Lime, Sung Wng Kim*, and Kyu Hyoung Lee*, ***Scripta Materialia***, 2019 Jul;167:120-125

51. "Correlation between thermoelectric transport properties and crystal structure in two-dimensional $CrSiTe_3$", Kyu Hyoung Lee, Ho Sung Yu, Sang-Il Kim, Seung Pil Moon, Jae-Yeol Hwang*, and Sung Wng Kim*, ***Journal of Alloys and Compounds***, 2019 Jun;790:93-98

52. "Potential-current co-adjusted pulse electrodeposition for highly (110)-oriented $Bi_2Te_{3-x}Se_x$ films", Jiwon Kim, Kyu Hyoung Lee, Sung Wng Kim, and Jae-Hong Lim*, ***Journal of Alloys and Compounds***, 2019 May;787:767-771

53. "Improved trade-off between thermoelectric performance and mechanical reliability of Mg_2Si by hybridization of few-layered reduced graphene oxides", Gwansik Kim, Sung Wng Kim*, Hyun Jun Rim, Hwijong Lee, Jeongmin Kim, Jong Wook Roh, Byung-Wook Kim, Kyu Hyoung Lee*, and Wooyoung Lee*, ***Scripta Materialia,*** 2019 Mar;162:402-407

54. "Synergetic effect of grain size reduction on electronic and thermal transport properties by selectively-suppressed minority carrier mobility and enhanced boundary scattering in $Bi_{0.5}Sb_{1.5}Te_3$ alloys" Kyu Hyoung Lee, Weon Ho Shin, Hyun-Sik Kim, Kimoon Lee, Jong Wook Roh, Joonyeon Yoo, Ji-il Kim, Sung Wng Kim*, and Sang-il Kim*, ***Scripta Materialia***, 2019 Feb;160:15-19

55. "Lowering the Schottky barrier height by graphene/Ag electrodes for high-mobility MoS_2 field-effect transistors", Sang-Soo Chee, Dongpyo Seo, Hanggyu Kim, Hanbyeol Jang, Seungmin Lee, Seung Pil Moon, Kyu Hyoung Lee, Sung Wng Kim, Hyunyong Choi, and Moon-Ho Ham*, ***Advanced Materials***, 2019 Jan;31(2):1804422

56. "Dramatically enhanced stability of silver passivated dicalcium nitride electride: Ag-Ca_2N", K. P. Faseela, Ye Ji Kim, Seong-Gon Kim, Sung Wng Kim*, and Seunghyun Baik*, ***Chemistry of Materials***, 2018 Nov;30(21):7803-7812

57. "Birch eeduction of aromatic compounds by inorganic electride $[Ca_2N]^+ \cdot e^-$ in an alcoholic solvent: An analogue of solvated electrons", Byung Il Yoo, Ye Ji Kim, YoungMin You, Jung Woon Yang and Sung Wng Kim*, ***The Journal of Organic Chemistry***, 2018 Nov;83(22):13847-13853

58. "Hydrogen adsorption engineering by intramolecular proton transfer on 2D nanosheets", Hanleem Lee, Sora Bak, Yunhee Cho, Meeree Kim, Se Hwang Kang, Viet Q. Bui, Hung M. Lee, Sung Wng Kim, and Hyoyoung Lee*, ***NPG Asia Materials***, 2018 May;10(5):441-454

59. "Origin of extremely large magnetoresistance in the candidate type-II Weyl semimetal $MoTe_{2-x}$", Sangyun Lee, Jaekyung Jang, Sung-Il Kim, Soon-Gil Jung, Jihyun Kim, Suyeon Cho, Sung Wng Kim, Joo Yull Rhee, Kee-Su Park & Tuson Park*, ***Scientific Reports***, 2018 Dec;8(1):13937

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ISSUED PATENTS (SELECTED RECORDS AMONG 68 PATENTS)

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12. METHOD FOR PREPRARING TWO-DIMENSION OF THREE-DIMENSIONAL MATERIALS THROUGH ELECTROCHEMISTRY, KOR 10-2329059, Nov. 16, 2021

13. **Patent Technology Transfer**: Japanese company, AGC Inc. has used the technology of the patents (JPN 6869590, JPN 4495757, JPN 4833221) in order to materialize the electro-conductive 12CaO7Al2O3 material as an electrode of the fluorescent light tube.