

CURRICULUM VITAE

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Personal Information

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Education

2004.09 – 2008.08 Ph. D., Materials Science and Engineering, Korea University, Seoul, Korea.
2002.03 – 2004.02 M. E., Materials Science and Engineering, Korea University, Seoul, Korea.
1995.03 – 2002.02 B. E., Metallurgical Engineering, Korea University, Seoul, Korea.
* interrupted by mandatory military service in Republic of Korea for three years

Professional Experiences

2021.09 – present Associate Professor, Department of Physics, **Chungbuk National University**, Cheongju, Korea
2017.09 – 2021.08 Assistant Professor, Department of Physics, **Chungbuk National University**, Cheongju, Korea
2013.07 – 2017.08 Research Professor, **Center for Integrated Nanostructure Physics (CINAP), Institute for Basic Science (IBS)**, Sungkyunkwan University (SKKU), Suwon, Korea.
2011.07 – 2013.07 Senior engineer, System LSI / Semiconductor R&D center, **Samsung electronics**, Yong-in/Hwasung, Korea.
2009.04 – 2011.04 Post-doctoral Fellow, **CEA-Grenoble, Leti/MINATEC**, Grenoble, France.
2008.09 – 2009.03 Post-doctoral Fellow, **Korea Institute of Science and Technology (KIST)**, Seoul, Korea.
2002.01 – 2008.08 Research Assistant, **Korea Institute of Science and Technology (KIST)**, Seoul, Korea

Professional activities

2022.09 – 2023.07 Visiting scholar, The University of North Carolina at Chapel Hill, NC, US, (Prof. Jim Cahoon group)
2020 – 2022 "New Physics: Sae Mulli" SCOPUS journal Vice-Executive Editor
2019 – present "Current Applied Physics" SCI journal Editorial Board Member.

Published journals

*Corresponding author

[49] Yunxiu Zhao, Anabil Gayen, Lin Huang, Xiao You, Nguyen Le Thi, Qoimatul Mustaghfiroh, Fathiya Rahmani, Prashant Vijay Gaikwad, Pham Duc Huyen Yen, Je-Ho Shim, Dong Eon Kim, Hee Jun Shin, Jaehun Park, Caihua Wan, Ou Xiang, Hong-Guang Piao, Kyung-Ho Kim, Junhyeok Bang, **Hyun Seok Lee**, Kyung Wan Kim*, and Dong-Hyun Kim*, "Quantifying Spin-Charge Conversion Mechanisms for THzEmission in Magnetic Multilayers", **Adv. Opt. Mater.** **2302571 (2024)** [\[Link\]](#)

[48] Mingu Kang, Su Jin Kim, Huitae Joo, Yeonjeong Koo, Hyeongwoo Lee, **Hyun Seok Lee***, Yung Doug Suh*, and Kyoung-Duck Park*, "Nanoscale manipulation of exciton-trion interconversion in a MoSe₂ monolayer via tip-enhanced cavity-spectroscopy", **Nano Lett.** **24, 279, (2023)** [\[Link\]](#)

[47] Taeyeon Kim and **Hyun Seok Lee***, "Growth Control of CVD-grown WS₂ Monolayers via O₂ Plasma Pre-treatment of Liquid Precursor Coatings" **New Phys.: Sae Mulli** **73, 893-899, (2023)** [\[Link\]](#)

[46] Jung Ho Kim, Jubok Lee, Changwon Seo, Gang Hee Han, Byeong Wook Cho, Jeongyong Kim, Young Hee Lee, and **Hyun Seok Lee***, "Polymer-waveguides-integrated 2D semiconductor heterostructures for optical communications", **Nano Lett.**, **23,11019-11025 (2023)** [\[Link\]](#)

- [45] Yae Zy Kang, Gwang Hwi An, Min-Gi Jeon, So Jeong Shin, Su Jin Kim, Min Choi, Jae Baek Lee, Tae Yeon Kim, Ikhwan Nur Rahman, Hyun Young Seo, Seyoung Oh, Byungjin Cho, Jihoon Choi*, and **Hyun Seok Lee***, "Increased mobility and reduced hysteresis of MoS₂ field-effect transistors via direct surface precipitation of CsPbBr₃-nanoclusters for charge transfer doping", **Nano Lett.** **23**, 8914–8922, (2023) [\[Link\]](#)
- [44] Su Jin Kim, Gwang Hwi An, Min Choi, Yae Zy Kang, Tae Yeon Kim, Ikhwan Nur Rahman, Junhyeok Bang, Kyung Wan Kim, Dong-Hyun Kim, and **Hyun Seok Lee***, "Crystal violet as CMOS-compatible alkali-free promoter for CVD growth of MoSe₂ monolayers: Comparative surface analysis with alkali-based promoter", **Curr. Appl. Phys.** **48**, 106 (2023) [\[Link\]](#)
- [43] Jungchun Kim, Gwang Hwi An, Seain Bang, Dong Geun Park, Donghyun Kim, Seunghye Jin, Min Jung Kim, **Hyun Seok Lee***, and Jae Woo Lee*, "Comparative analysis of Schottky barriers for heterogeneous defect domains in monolayer WS₂ field-effect transistors", **Appl. Surf. Sci.** **604**, 154600 (2022) [\[Link\]](#)
- [42] Lin Huang, Yunxiu Zhao, Nguyen Le Thi, Sang-Hyuk Lee, Zhi Peng, Seongheun Kim, Hee Jun Shin, Jaehun Park, Hyun-Joong Kim, Jung-Il Hong, Junhyeok Bang*, **Hyun Seok Lee***, Kyung Wan Kim*, and Dong-Hyun Kim*, "Observation of magnetoconductivity with terahertz probes for ferromagnetic Fe films", **Curr. Appl. Phys.** **41**, 81 (2022) [\[Link\]](#)
- [41] Min Choi, Jae Woo Lee, and **Hyun Seok Lee***, "Optical and electrical characterizations of volatile doping effect originated from bilayer photoresist process in MoS₂ field-effect transistors", **J. Korean Phys. Soc.** **81**, 317 (2022) [\[Link\]](#)
- [40] Evan S. H. Kang, * Sriram KK, Inho Jeon, Jehan Kim, Shangzhi Chen, Kyoung-Ho Kim, Ka-Hyun Kim, **Hyun Seok Lee**, Fredrik Westerlund, and Magnus P. Jonsson* "Organic Anisotropic Excitonic Optical Nanoantennas", **Adv. Sci.** **2201907** (2022) [\[Link\]](#)
- [39] Gwang Hwi An, Su Jin Kim, Sanghyeon Kim, So Jeong Shin, Min Choi, Dohyun Kim, Ikhwan Nur Rahman, Junhyeok Bang, Kyungwan Kim, Dong-Hyun Kim, and **Hyun Seok Lee***, "Growth mode control of CVD-grown WS₂ monolayer flakes via O₂ pre-annealing for organic surfactant oxidation", **Appl. Surf. Sci.** **585**, 152564 (2022) [\[Link\]](#)
- [38] M. Choi, S. K. Kang, S. Kim, S. J. Kim, G. H. An, S. J. Shin, D. Kim, I. N. Rahman, J. Bang, K. Kim, D.-H. Kim, and **H. S. Lee***, "Mo nitrides and carbonitrides via metallic phase transition of MoO₃ films using ammonium salt precursors in chemical vapor deposition", **Curr. Appl. Phys.**, **33**, 59 (2021) [\[Link\]](#)
- [37] J. H. Kim, J. Lee, S. Park, C. Seo, S. J. Yun, G. H. Hane, J. Kim, Y. H. Lee, and **H. S. Lee***, "Locally enhanced light–matter interaction of MoS₂ monolayers at density-controllable nanogrooves of template-stripped Ag films", **Curr. Appl. Phys.**, **33**, 59 (2021) [\[Link\]](#)
- [36] K.-H. Kim, J. Leeb, E.S.H. Kang, D.-H. Kim, and **H. S. Lee***, "Gap plasmon modes resolved by ultraflat nanogap and linear polarization in terrace-stepped hexagonal boron nitride spacer sandwiched by Ag nanowire and metal substrates", **Curr. Appl. Phys.**, **31**, 16 (2021) [\[Link\]](#)
- [35] S. Lee and **H. S. Lee***, "Reduction of Water-soluble Nitrate ion in dust Using Alternative Compound Fuels in Fine-dust-reduction Cement Process", **New Physics: Sae Mulli**, **71**, 117 (2021) [\[Link\]](#)
- [34] Y. Koo, Y. Kim, S. H. Choi, H. Lee, J. Choi, D. Y. Lee, M. Kang, **H. S. Lee**, K. K. Kim, G. Lee, K.-D. Park*, "Tip-induced nano-engineering of strain, bandgap, and exciton dynamics in 2D semiconductors", **Adv. Mater.**, **33**, 2008234 (2021) [\[Link\]](#)
- [33] S. Roy, M.-H. Doan, J. Kim*, S. K. Kang, G. H. Ahn, **H. S. Lee**, and Seok Joon Yun, "Modulation of optoelectric properties of monolayer transition metal dichalcogenides placed on a metal pattern", **J. Korean Phys. Soc.**, **16**, 2003326 (2021) [\[Link\]](#)
- [32] J. Lee, S. J. Yun, C. Seo, K. Cho, T. S. Kim, G. H. An, K. Kang, **H. S. Lee**, and J. Kim*, "Switchable, Tunable, and Directable Exciton Funneling in Periodically Wrinkled WS₂", **Nano Lett.** **21**, 43 (2021) [\[Link\]](#)
- [31] S. C. Jang, J.-M. Park, H.-D. Kim, **H. S. Lee***, and H.-S. Kim*, "The Effect of Microwave Annealing Time on the Electrical Characteristics for InGaZnO Thin-Film Transistors", **Korean J. Mater. Res.** **30**, 615 (2020) [\[Link\]](#)

- [30] G. H. An^{1st}, **S. J. Yoon^{1st}**, Y. H. Lee*, **H. S. Lee***, "Growth mechanism of alternating defect domains in hexagonal WS₂ via inhomogeneous W-precursor accumulation", **Small**, **16**, 2003326 (2020) [\[Link\]](#)
- [29] J. H. Kim, **H. S. Lee***, G. H. An, J. Lee, H. M. Oh, J. Choi, and Y. H. Lee, "Dielectric Nanowire Hybrids for Plasmon-Enhanced Light-Matter Interaction in 2D Semiconductors", **ACS Nano**, **14**, 11985 (2020) [\[Link\]](#)
- [28] S.-J. Shin and **H. S. Lee***, "Projection photolithography for microscale patterning and 2D field-effect transistor demonstration", **New Physics: Sae Mulli**, **70**, 715 (2020) [\[Highlight Article\]](#) [\[Link\]](#)
- [27] S. K. Kang and **H.S.Lee***, "Study on Growth Parameters for Monolayer MoS₂ Synthesized by CVD Using Solution-based Metal Precursors", **Appl. Sci. Conver. Technol.** **28**, 159-163 (2019) [\[Cover Image\]](#) [\[Link\]](#)
- [26] M. R. Sihn, S. Yun, A. Kirakosy, M.-G. Jeon, **H.S.Lee***, and J. Choi*, "Cu ion-induced photoluminescence quenching of methylammonium lead bromide nanocrystals", **J. Photoch. Photobio. A**, **384**, 112041(2019) [\[Link\]](#)
- [25] J. H. Kim, J. Lee, H. Kim, S. J. Yun, J. Kim, **H.S.Lee***, and Y. H. Lee*, "Optical logic operation via plasmon-exciton interconversion in 2D semiconductors", **Sci. Rep.** **9**, 9164 (2019) [\[Link\]](#)
- [24] **S. J. Kim** and **H.S.Lee***, "Dependence of the Selective Doping Effects of Heterogeneous Defect Domains in Hexagonal-WS₂ on Wet-Transfer Methods", **New Physics: Sae Mulli**, **69**, 601(2019) [\[Link\]](#)
- [23] **M. Yoo**, S. Miyeon, S. So, **H.S.Lee**, and C. Lee*, "Study on the Temperature Distribution Analysis Using Near Located H₂O Absorption Signals", **Nanosci. Nanotech. Lett.**, **10**, 1058(2018) [\[Link\]](#)
- [22] D. H. Luong, **H.S.Lee***, G. Ghimire, J. Lee, H. Kim, S. J. Yun, **G. H. An**, and Y. H. Lee*, "Enhanced Light-Matter Interactions in Self-Assembled Plasmonic Nanoparticles on 2D Semiconductors", **Small**, **14**, 1802949 (2018) [\[Link\]](#)
- [21] K. K. Kim*, **H.S.Lee***, and Y. H. Lee*, "Synthesis of Hexagonal Boron Nitride Heterostructures for 2D van der Waals Electronics", **Chem. Soc. Rev.** **47**, 6342(2018) [\[Link\]](#)
- [20] J. H. Kim, S. J. Yun, **H.S.Lee**, J. Zhao, H. Bouzid, and Y. H. Lee*, "Plasma-Induced Phase Transformation of SnS₂ to SnS", **Sci. Rep.** **8**, 10284(2018) [\[Link\]](#)
- [19] D. H. Luong^{1st}, **H.S.Lee^{1st*}**, G. P. Neupane, S. Roy, G. Ghimire, J. H. Lee, Q. A. Vu, and Y. H. Lee*, "Tunneling photocurrent assisted by interlayer excitons in staggered van der Waals heterobilayers", **Adv. Mater.** **29**, 1701512 (2017) [\[Link\]](#)
- [18] H. Y. Jeong^{1st}, Y. Jin^{1st}, S. J. Yun, J. Zhao, J. Baik, D. H. Keum, **H.S.Lee***, and Y. H. Lee*, "Heterogeneous defect domains in single-crystalline hexagonal WS₂", **Adv. Mater.** **29**, 1605043 (2017) [\[Link\]](#)
- [17] **H. S. Lee***, D. H. Luong, M. S. Kim, Y. Jin, H. Kim, S. Yun, and Y. H. Lee*, "Reconfigurable exciton-plasmon interconversion for nanophotonic circuits", **Nat. Commun.** **7**, 13663 (2016) [\[Media\]](#)[\[Movie\]](#) [\[Link\]](#)
- [16] **H.S.Lee***, M. S. Kim, H. Kim, and Y. H. Lee*, "Identifying multiexcitons in MoS₂ monolayers at room temperature", **Phys. Rev. B: Rapid Communications** **93**, 140409 (2016) [\[Link\]](#)
- [15] Y. Jin, D. H. Keum, S.-J. An, J. Kim, **H.S.Lee***, and Y. H. Lee*, "Van der Waals homojunction: Ideal p-n diode behavior in MoSe₂", **Adv. Mater.** **27**, 5534(2015) [\[Link\]](#)
- [14] **H. S. Lee***, M. S. Kim, Y. Jin, G. H. Han, Y. H. Lee*, and J. Kim*, "Selective amplification of the primary exciton in a MoS₂ monolayer", **Phys. Rev. Lett.** **115**, 226801(2015) [\[Link\]](#)
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- [12] **H. S. Lee**, C. i Awada, S. Boutami, F. Charra, L. Douillard, R. Espiau de Lamaestre, "Loss mechanisms of surface plasmon polaritons propagating on a smooth polycrystalline Cu surface", **Opt. Express**. **20**, 8974(2012)

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- [10] Y.-w. Park, **H. S. Lee**, H. W. Ahn, Z. Wu, S. Lee, J.-h. Jeong, D. S. Jeong, K.-w. Yi, and B.-k. Cheong, "The effect of Ge addition on the RESET operation of a phase-change memory (PCM) device using Ge-doped SbTe", **Curr. Appl. Phys.**, **10**, e79 (2010).
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- [7] J.-h. Jeong, **H. S. Lee**, S. Lee, T. S. Lee, W. M. Kim, Wu Zhe, S. C. Kim, K. H. Oh and B.-k. Cheong, "Crystallization and memory programming characteristics of Ge-doped SbTe materials of varying Sb:Te ratio", **J. Phys. D**, **42**, 035104 (2009).
- [6] **H. S. Lee**, T. S. Lee, Y. Lee, J. Kim, S. Lee, J.-Y. Huh, D. Kim, and B.-k. Cheong, "Microstructural and optical analysis of superresolution phenomena due to $\text{Ge}_2\text{Sb}_2\text{Te}_5$ thin films at blue light regime", **Appl. Phys. Lett.**, **93**, 221108 (2008).
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- [4] **H. S. Lee**, T. S. Lee, J.-h. Jeong, S. Lee, W. M. Kim, and B.-k. Cheong, "A real time electrical-optical characterization of PbTe thin film material for superresolution optical memory", **Electron. Mater. Lett.**, **3**, 13, (2007).
- [3] T. S. Lee, **H. S. Lee**, B.-k. Cheong, J.-h. Jeong, D.-H. Kang, Wu Zhe, W. M. Kim, D. Kim, and K. Cho, "Toward understanding the mechanism of nonlinear optical characteristics of PbTe thin film for nano-optical memory", **J. Nanosci. Nanotechnol.**, **7**, 293 (2007).
- [2] **H. S. Lee**, B.-k. Cheong, T. S. Lee, K. Seok Lee, and W. M. Kim, and J. Y. Huh, "A semiconducting thermo-optic material for potential application to super-resolution optical data storage", **Surf. Coat. Tech.**, **193**, 335(2005).
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Patents

출원번호 10-2022-0036470 (2022.03.24)

"고온 발생을 위한 마이크로 히터 및 그의 제작 방법"

신현준, **이현석**, 김동현, 김태연, 이재백, 장한솔, 김건휘, 곽호재

출원번호 10-2022-0007467 (2022.01.18)

"콘택 구조의 형성 방법, 반도체 소자의 제조방법, 콘택 구조 및 이를 포함하는 반도체 소자"

김가현, **이현석**, 이재우, 오준호

출원번호: 10-2021-0088293 (2021.07.06)

"반도체 소자의 제조방법"

이현석, 강선경, 김수진

등록번호: 10-2499815 (2023.02.09)

"시냅스 소자"

이현석, 이재우, 김현석, 박지민

출원번호: 10-2020-0076800 (2020. 06.23)

"다공성 실리콘층과 실리콘사이드층을 구비하는 반도체 컨택 구조물 및 이를 포함하는 반도체 소자"

이현석, 김가현, 이재우

US10712479 (July 14, 2020 registration)

KR101835202 (Feb. 27, 2018 registration)

"Wavelength multiplexing device"

H.S. Lee, Y.H. Lee

US9455290 (Sep. 27, 2016 registration)

"Image sensor including a photonic crystal, an operating method thereof, and a data processing system including the image sensor"

H.J. Jin, H.S. Lee, T.C.Kim

US9142577 B2 (Sep.22, 2015 registration)

"Photodetector and image sensor including the same"

H.S. Lee, J.K. Jung, Y.D. Park, T.Y. Lee

US9294702 B2 (Mar. 22, 2016 registration)

CN103855110 A (Jun. 11, 2014 registration)

"Image sensors for performing thermal reset, methods thereof, and devices including the same"

T. Y. Lee, J. K. Jung, Y. D. Park, H. S. Lee

KR100930079 (Nov. 27, 2009 registration)

US7940637 B2 (May 10, 2011 registration)

"An optical recording media having super-resolution structure for improvement of reproducing stability and characteristic of noise in low band"

W. Hwang, J. Kim, J. Kim, T.-S. Lee, B.-K. Cheong, H. S. Lee, S. Lee, W.-M. Kim, J.-h. Jeong

KR100928197 (Nov. 17, 2009 registration)

US 7906195 (Mar. 15, 2011 registration)

"Super-resolution material and high density optical information storage medium using same"

B.-K. Cheong, T.S. Lee, H. S. Lee, J.-h. Jeong, S. Lee, W.-M.Kim

KR100597992 (Jun. 30, 2006 registration)

US7758941 (Jul. 20, 2010 registration)

"Optical data storage medium with super resolution layer"

B.-K. Cheong, H. S Lee, T. S. Lee, W.-M. Kim, K.-S. Lee, J.-W. Lee, S.-H. Cho

Honors

- ✓ 2019 Grand prize, SK Hynix open innovation idea contest for semiconductors [\[Link\]](#)
- ✓ 2018 Young Science faculty in the year of 2018, by Department of Physics, Chungbuk National University
- ✓ 2016 Director's prize in the year of 2016, by Center for Integrated Nanostructure Physics (CINAP), Institute for Basic Science (IBS), Director: Young Hee Lee