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Professional Careers

Assistant Professor	Seoul, South Korea
Department of Physics (JA: Chemistry), Soongsil University	03/2021 – Present
Postdoctoral Researcher Electrical and Computer Engineering, University of California San Diego (Advisor: Prof. Shadi A. Dayeh)	La Jolla, CA, USA 09/2018 – 02/2021
Education	
Ph.D. in Physics	
Department of Physics and Astronomy, Seoul National University Dissertation: Hexagonal boron nitride based hybrid nanomaterials for flexible electronic and optoelectronic devices (Best thesis awarded) (Advisor: Prof. Gyu-Chul Yi)	Seoul, South Korea 03/2011 – 08/2018

B.S. in Physics (Minor: Mathematics)

Department of Physics, Pohang University of Science and Technology (POSTECH) (Military service: 04/2007 – 06/2009)

Pohang, South Korea 03/2004 – 02/2011

Selected Publications (#: equal contribution, *: Co-corresponding author)

- Jo, Hyerin[#], Jiseong Jang[#], Hyeon Jung Park[#], Huigu Lee, Sung Jin An, Jin Pyo Hong^{*}, Mun Seok Jeong^{*}, and Hongseok Oh^{*}. "Physical Reservoir Computing Using Tellurium-Based Gate-Tunable Artificial Photonic Synapses." ACS Nano, 18, 44 (2024): 30761–73.
- Ali, Asad, Jamin Lee, Kyoungho Kim, Hongseok Oh*, and Gyu-Chul Yi*. "Highly Sensitive and Fast Responding Flexible Force Sensors Using ZnO/ZnMgO Coaxial Nanotubes on Graphene Layers for Breath Sensing." Advanced Healthcare Materials (2024): 2304140.
- 3. **Jo, Hyerin**, Asad Ali, **Won Suk Oh**, Sung Jin An, Gyu-Chul Yi, and **Hongseok Oh**. "Flexible Photonic Synapses Using Vertical ZnO Nanotubes on Graphene Films." *IEEE Journal of Selected Topics in Quantum Electronics* (2023).
- Oh, Hongseok, Gyu-Chul Yi, Michael Yip, and Shadi A. Dayeh. "Scalable tactile sensor arrays on flexible substrates with high spatiotemporal resolution enabling slip and grip for closed-loop robotics." *Science Advances* 6, no. 46 (2020): eabd7795.
- Oh, Hongseok, JunBeom Park, Woojin Choi, Heehun Kim, Youngbin Tchoe, Arpana Agrawal, and Gyu-Chul Yi. "Vertical ZnO nanotube transistor on a graphene film for flexible inorganic electronics." *Small* 14, no. 17 (2018): 1800240.

Scientific Services

Editorial Board Member

Scientific Reports (Nature Portfolio)

09/2024 - Present

Academic Committee Member	
Semiconductor Physics Division, The Korean Physical Society	03/2025 – Present
Deputy Executive Director (부실무이사)	
Commission for Physics Education Initiative, The Korean Physical Society (한국물리학회 물리교육진흥원)	2023 – 2024
Conference Program Committee	
Vice chair, Sensors and Flexible Electronics Division, International Symposium on the Physics of Semiconductors and Applications (ISPSA 2024, 2026)	2023 – Present
Member, Nanoelectronics Division, NANO KOREA Conference (2023, 2024, 2025)	2022 – Present
Member, Nanomaterials/Nanodevices/Nanotools Division, International Conference on Advanced Materials and Devices (ICAMD 2023, 2025)	2023 – Present
Session Organizer	
Focus Session: Advanced Sensors, 2024 KPS Spring Meeting	2024
Focus Session: Neuromorphic and Future Computing Devices, 2024 KPS Fall Meeting	2024
Focus Session: Next-Generation Optoelectronic Devices, 2025 KPS Spring Meeting	2025
Symposium for Oxide-Based Advanced Materials and	
2025 Spring/Fall Meetings, The Korean Ceramic Society	2025

Invited Talks

ZnO based pressure sensors and artificial synapses	Seoul, South Korea
2024 Fall Meeting, The Korean Ceramic Society	10/2024
Fabrication and characterization of photonic synapse devices using ZnO thin films and nanostructures	Taoyuan City, Taiwan
2024 Annual Meeting of the Physical Society of Taiwan	1/2024
Photonic synapses based on ZnO thin films and nanostructures	Gyeongju, South Korea
Materials Research Society of Korea, Fall Conference 2023	11/2023
Thin film transistors for synaptic transistor applications	Daejeon, South Korea
2023 KPS Spring Meeting	04/2023
Thin film transistors for high-resolution force imaging and synaptic device applications	Oita, Japan
The 7 th Asian Applied Physics Conference	11/2022
Heteroepitaxy on large-scale synthesized 2D materials for transferable electronics and sensors	Jeju, South Korea
Materials Research Society of Korea, Fall Conference 2022	11/2022
Heteroepitaxy on 2D materials for transferable optoelectronics	Busan, South Korea
The 9 th Korean Symposium on Graphene and 2D Materials	07/2022

Awards

Natural Science Award (자연과학상)

College of Natural Sciences, Soongsil University	
Samsung Graduate Fellowship	
Sponsorship Program at Device Solutions, Samsung Electronics Co., Ltd.	2015 - 2018
The Best Thesis Award	09/2018
College of Natural Science, Seoul National University	
The Young Scientist Award	11/2016
The Korean Academy of Science and Technology	
The Best Talk Award	04/2016
2016 KPS Spring Meeting, The Korean Physical Society	
The Best Poster Award	
The 50th Winter Annual Conference of the Korean Vacuum Society, The Korean Vacuum Society	02/2016

Courses

Introduction to quantum- and nano-sciences (양자나노과학개론)	2021 - Present
Synthesis and analysis of quantum- and nano-materials (양자나노소재합성및분석)	2021 - Present
Electronic circuits laboratory (전자회로실험)	2021 - Present
Introduction to semiconductor manufacturing process (반도체공정의이해)	2022 - Present
Advanced semiconductor fabrication technology (반도체집적공정)	2023 - Present
Physics of Semiconductor Devices (반도체소자물리)	2024 - Present

Full list of publications (#: equal contribution, *: Co-corresponding author) (https://scholar.google.co.kr/citations?user=c_UKVHUAAAAJ&hl=en)

- 1. Jehui Kim, Hyunsoo Kim, Kyusun Han, and Hongseok Oh*, "Transparent double-gate IGZO TFTs for high-performance transparent electronics", Semiconductor Science and Technology, (2025)
- 2. Heesoo Kim, Anh Thi Dieu Nguyen, Beomjun Kim, Hyerin Jo, Imasda Rahmatulloh, Hyobin Yoo, Hongseok Oh, Aziz Ahmed, Hyeonjun Beak, and Kunook Chung*, "In-situ fabrication of GaN/short-range ordered BN heterostructure light-emitting diodes", NPG Asia Materials, 17, 1 (2025): 1-10.
- 3. Yung-Chi Yao, Chia-Jung Lee, Yong-Jun Chen, Jun-Zhi Feng, Hongseok Oh, Chin-Shan Lue*, Jinn-Kong Sheu*, and Ya-Ju Lee*, "All-inorganic perovskite quantum-dot optical neuromorphic synapses for near-sensor colored image recognition", Advanced Science, (2024): 2409933.
- 4. Junhyun Kim, Hyunsoo Kim, Jaewon Kim, and Hongseok Oh*, "UV response of IGZO tunnel-contact SGTs for low-power and high-sensitivity UV sensor applications", Chinese Journal of Physics, 93, (2025): 340-47.
- 5. Yedam Lee, Hyunsoo Kim, Hyerin Jo, and Hongseok Oh, "Fabrication of an in-rich IGZO TFT by co-sputtering of In2O3 and IGZO and characterization of its compensated positive bias stress properties", Transactions on Electrical and Electronic Materials, (2024): 1-7.
- 6. Jaewook Park, Won Suk Oh, Jaegoo Lee, and Hongseok Oh, "Improving endurance and thermal stability in IGZO-based ReRAM using an a-BN intermediate layer", The Journal of the Korean Physical Society, (2025): 1-7.

- Asad Ali, Han Ik Kim, Eunsu Lee, Dongha Yoo, Hongseok Oh, and Gyu-Chul Yi, "Fabrication of a piezoelectric ZnO/ZnMgO coaxial nanorod force sensor on Ti-wire for intravascular intervention monitoring", *Advanced Materials Technologies*, (2024): 2401558.
- Kim, I., Ryu, J., Lee, E., Lee, S., Lee, S., Suh, W., Lee, J., Kim, M., Oh, H. S., & Yi, G.-C. (2024). Molecular beam epitaxial In2Te3 electronic devices. NPG Asia Materials, 16(1), 1–6.
- Lee, Yedam, Hyunsoo Kim, Hyerin Jo, and Hongseok Oh*. "Fabrication of an In-Rich IGZO TFT by Co-Sputtering of In₂O₃ and IGZO and Characterization of Its Compensated Positive Bias Stress Properties." *Transactions on Electrical and Electronic Materials*, October 29, 2024, 1–7.
- Jo, Hyerin[#], Jiseong Jang[#], Hyeon Jung Park[#], Huigu Lee, Sung Jin An, Jin Pyo Hong^{*}, Mun Seok Jeong^{*}, and Hongseok Oh^{*}. "Physical Reservoir Computing Using Tellurium-Based Gate-Tunable Artificial Photonic Synapses." ACS Nano, October 24, 2024. https://doi.org/10.1021/acsnano.4c10489.
- 11. Ali, Asad, Jamin Lee, Kyoungho Kim, **Hongseok Oh***, and Gyu-Chul Yi*. "Highly Sensitive and Fast Responding Flexible Force Sensors Using ZnO/ZnMgO Coaxial Nanotubes on Graphene Layers for Breath Sensing." *Advanced Healthcare Materials* (2024): 2304140.
- 12. Lee, Yedam, Hyunsoo Kim, Hyerin Jo, and Hongseok Oh*. "Fabrication and Characterization of High Mobility In₂O₃ TFT." *Journal of Flexible and Printed Electronics* 3 (1): 121–29. (2024)
- Jo, Hyerin[#], Asad Ali[#], Won Suk Oh, Sung Jin An, Gyu-Chul Yi^{*}, and Hongseok Oh^{*}. "Flexible Photonic Synapses Using Vertical ZnO Nanotubes on Graphene Films." *IEEE Journal of Selected Topics in Quantum Electronics: A Publication of the IEEE Lasers and Electro-Optics Society* 30, no. 3: Flexible Optoelectronics (May 2024): 1–8.
- 14. Tan, Hao, Angelique C. Paulk, Brittany Stedelin, Daniel R. Cleary, Caleb Nerison, Youngbin Tchoe, Erik C. Brown et al. "Intraoperative application and early experience with novel high-resolution, high-channel-count thin-film electrodes for human microelectrocorticography." *Journal of Neurosurgery* 1, no. aop (2023): 1-12.
- Jaewon Kim[#], Seunghyun Oh[#], Hyerin Jo, and Hongseok Oh^{*}, "IGZO thin-film transistors with tunneling contacts: towards power efficient display." *Applied Physics Express* 16, no. 5 (2023): 054022.
- Hongseok Oh, Young Joon Hong, Gyu-Chul Yi, Hyeonjun Baek, Dong Ryeol Lee, and Hyun Hwi Lee*, "Initial growth behavior in catalyst-free-grown vertical ZnO nanorods on c-Al₂O₃, as observed using synchrotron-radiation X-ray scattering." *Crystal Growth & Design* 23.3 (2023): 1434-1441.
- 17. Hongseok Oh*, Hyunsoo Kim, and Hyerin Jo, "MeaSSUre:/-V: Open software for transistor characterization using source-meter units." *SoftwareX* 21 (2023):101318
- 18. Hongseok Oh*, "Heteroepitaxially grown semiconductors on large-scale 2D nanomaterials for optoelectronics devices", *Ceramist* 25.4 (2022): 412-426.
- Lee, Yeojin, Hyerin Jo, Kooktae Kim, Hyobin Yoo, Hyeonjun Baek, Dong Ryeol Lee, and Hongseok Oh*. "IGZO synaptic thin-film transistors with embedded AlO_x charge-trapping layers." *Applied Physics Express* 15, no. 6 (2022): 061005.
- 20. Tchoe, Youngbin, et al. "Human brain mapping with multithousand-channel PtNRGrids resolves spatiotemporal dynamics." *Science translational medicine* 14.628 (2022): eabj1441.
- Lee, Sang Heon, et al. "Scalable thousand channel penetrating microneedle arrays on flex for multimodal and large area coverage brainmachine interfaces." *Advanced Functional Materials* (2022): 2112045.
- Oh, Hongseok, and Gyu-Chul Yi. "Synthesis of Atomically Thin h-BN Layers Using BCl₃ and NH₃ by Sequential-Pulsed Chemical Vapor Deposition on Cu Foil." *Nanomaterials* 12.1 (2021): 80.
- 23. **Oh, Hongseok**, et al. "Large-scale, single-oriented ZnO nanostructure on h-BN films for flexible inorganic UV sensors." *Journal of Applied Physics* 130.22 (2021): 223105.
- 24. Park, Jun Beom, Minho S. Song, Ramesh Ghosh, Rajendra Kumar Saroj, Yunjae Hwang, Youngbin Tchoe, **Hongseok Oh**, Hyeonjun Baek, Yoonseo Lim, Bosung Kim, Sang-Woo Kim and Gyu-Chul Yi. "Highly sensitive and flexible pressure sensors using position-and dimension-

controlled ZnO nanotube arrays grown on graphene films." *NPG Asia Materials* 13, no. 1 (2021): 1-9.

- 25. **Oh, Hongseok**, and Shadi A. Dayeh. "An Analytical Model for Dual Gate Piezoelectrically Sensitive ZnO Thin Film Transistors." *Advanced Materials Technologies* (2021): 2100224.
- 26. Paulk, Angelique C., et al. "Microscale physiological events on the human cortical surface." *Cerebral Cortex* 31.8 (2021): 3678-3700.
- 27. Lee, Keundong, Dongha Yoo, **Hongseok Oh**, and Gyu-Chul Yi. "Flexible and monolithically integrated multicolor light emitting diodes using morphology-controlled GaN microstructures grown on graphene films." *Scientific reports* 10, no. 1 (2020): 1-7.
- Oh, Hongseok, Gyu-Chul Yi, Michael Yip, and Shadi A. Dayeh. "Scalable tactile sensor arrays on flexible substrates with high spatiotemporal resolution enabling slip and grip for closed-loop robotics." *Science advances* 6, no. 46 (2020): eabd7795.
- Tchoe, Youngbin, Minho S. Song, Heehun Kim, Hyeonjun Baek, Joon Young Park, Hongseok Oh, Keundong Lee, Kyungmin Chung, Jerome K. Hyun, and Gyu-Chul Yi. "Individually addressable, high-density vertical nanotube Schottky diode crossbar array." *Nano Energy* 76 (2020): 104955.
- 30. **Oh, Hongseok**, and Shadi A. Dayeh. "Physics-Based Device Models and Progress Review for Active Piezoelectric Semiconductor Devices." *Sensors* 20, no. 14 (2020): 3872.
- Ganji, Mehran, Angelique C. Paulk, Jimmy C. Yang, Nasim W. Vahidi, Sang Heon Lee, Ren Liu, Lorraine Hossain et al. "Selective formation of porous Pt nanorods for highly electrochemically efficient neural electrode interfaces." *Nano letters* 19, no. 9 (2019): 6244-6254.
- Chung, Kunook, Keundong Lee, Youngbin Tchoe, Hongseok Oh, JunBeom Park, Jerome K. Hyun, and Gyu-Chul Yi. "GaN microstructure light-emitting diodes directly fabricated on tungsten-metal electrodes using a micro-patterned graphene interlayer." *Nano Energy* 60 (2019): 82-86.
- Oh, Hongseok, JunBeom Park, Woojin Choi, Heehun Kim, Youngbin Tchoe, Arpana Agrawal, and Gyu-Chul Yi. "Vertical ZnO nanotube transistor on a graphene film for flexible inorganic electronics." *Small* 14, no. 17 (2018): 1800240.
- 34. Yi, Gyu Chul, and **Hong Seok Oh**. "Nano-structure assembly and nano-device comprising same." U.S. Patent 9,853,106, issued December 26, 2017.
- Yun, Jiyoung*, Hongseok Oh*, Janghyun Jo, Hyun Hwi Lee, Miyoung Kim, and Gyu-Chul Yi. "Selective-area heteroepitaxial growth of h-BN micropatterns on graphene layers." 2D Materials 5, no. 1 (2017): 015021. (*: Contributed equally)
- Chung, Kunook, Hongseok Oh, Janghyun Jo, Keundong Lee, Miyoung Kim, and Gyu-Chul Yi. "Transferable single-crystal GaN thin films grown on chemical vapor-deposited hexagonal BN sheets." NPG Asia Materials 9, no. 7 (2017): e410-e410.
- Oh, Hongseok, Janghyun Jo, Youngbin Tchoe, Hosang Yoon, Hyun Hwi Lee, Sung-Soo Kim, Miyoung Kim, Byeong-Hyeok Sohn, and Gyu-Chul Yi. "Centimeter-sized epitaxial h-BN films." NPG Asia Materials 8, no. 11 (2016): e330-e330.
- 38. Park, Jun Beom, **H. Oh**, J. Park, N-J. Kim, H. Yoon, and G-C. Yi. "Scalable ZnO nanotube arrays grown on CVD-graphene films." *Apl Materials* 4, no. 10 (2016): 106104.
- Chung, Kunook, Hyobin Yoo, Jerome K. Hyun, Hongseok Oh, Youngbin Tchoe, Keundong Lee, Hyeonjun Baek, Miyoung Kim, and Gyu-Chul Yi. "Flexible GaN light-emitting diodes using GaN microdisks epitaxial laterally overgrown on graphene dots." *Advanced materials* 28, no. 35 (2016): 7688-7694.
- Baek, Hyeonjun, Jun Beom Park, Jong-woo Park, Jerome K. Hyun, Hosang Yoon, Hongseok Oh, and Jiyoung Yoon. "ZnO nanolasers on graphene films." *Applied Physics Letters* 108, no. 26 (2016): 263102.
- Hyun, Jerome K., Taehee Kang, Hyeonjun Baek, Hongseok Oh, Dai-sik Kim, and Gyu-chul Yi. "Enhanced second harmonic generation by coupling to exciton ensembles in Ag-coated ZnO nanorods." ACS Photonics 2, no. 9 (2015): 1314-1319.

- Oh, Hongseok*, Young Joon Hong*, Kun-Su Kim, Sangmoon Yoon, Hyeonjun Baek, Seoung-Hun Kang, Young-Kyun Kwon, Miyoung Kim, and Gyu-Chul Yi. "Architectured van der Waals epitaxy of ZnO nanostructures on hexagonal BN." *NPG Asia Materials* 6, no. 12 (2014): e145e145. (*: Contributed equally)
- 43. Baek, Hyeonjun, Jerome K. Hyun, Kunook Chung, **Hongseok Oh**, and Gyu-Chul Yi. "Selective excitation of Fabry-Perot or whispering-gallery mode-type lasing in GaN microrods." *Applied Physics Letters* 105, no. 20 (2014): 201108.
- Xu, Jing, Chunrui Wang, Aijiang Lu, Binhe Wu, Xiaoshuang Chen, Hongseok Oh, Hyeonjun Baek, Gyu-Chul Yi, and Lizhi Ouyang. "Photoluminescence of excitons and defects in ZnSebased longitudinal twinning nanowires." *Journal of Physics D: Applied Physics* 47, no. 48 (2014): 485302.
- 45. Xu, Jing, Chunrui Wang, Binhe Wu, Xiaofeng Xu, Xiaoshuang Chen, **Hongseok Oh**, Hyeonjun Baek, and Gyu-Chul Yi. "Twinning effect on photoluminescence spectra of ZnSe nanowires." *Journal of Applied Physics* 116, no. 17 (2014): 174303.
- 46. Chung, Kunook, Hyeonjun Beak, Youngbin Tchoe, **Hongseok Oh**, Hyobin Yoo, Miyoung Kim, and Gyu-Chul Yi. "Growth and characterizations of GaN micro-rods on graphene films for flexible light emitting diodes." *Apl Materials* 2, no. 9 (2014): 092512.
- Xu, Jing, Aijiang Lu, Chunrui Wang, Rujia Zou, Xiaoyun Liu, Xing Wu, Yuxi Wang et al. "ZnSebased longitudinal twinning nanowires." *Advanced Engineering Materials* 16, no. 4 (2014): 459-465