

Jung-Hwan Song

Assistant professor

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Personal particulars

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Professional employment history

2024 – pres.	Assistant Professor	National University of Singapore, Singapore
2019 – 2024	Research Scientist	Stanford University, United States
2016 – 2019	Postdoctoral Researcher	Stanford University, United States
2014 – 2016	Postdoctoral Researcher	KAIST, Korea

Education

Ph. D.	Physics	KAIST	2014
B. S.	Physics (major), Mathematics (minor)	KAIST	2008 Summa cum laude

Research grants secured in Singapore

Grant	Role	Award
NUS Foresight Grant	Lead PI	2026
MOE AcRF Tier 1	Lead PI	2025

Selected publications

1. Skyler Peitso Selvin, Majid Esfandyarpour, Anqi Ji, Yan Joe Lee, Colin Yule, **Jung-Hwan Song**, Mohammad Taghinejad, and Mark L. Brongersma, “Acoustic wave modulation of gap plasmon cavities,” **Science** **389**, 516 (2025).
2. Sahil Dagli, Jiyong Shim, Hamish Carr Delgado, Halleh B Balch, Sajjad Abdollahramezani, Chih-Yi Chen, Varun Dolia, Elissa Klopfer, Jefferson Dixon, Jack Hu, Babatunde Ogunlade, **Jung-Hwan Song**, Mark L Brongersma, David Barton, Jennifer A Dionne, “GHz-speed wavefront shaping metasurface modulators enabled by resonant electro-optic nanoantennas,” **Advanced Materials**, e06790 (2025).
3. Francesco Monticone, ..., **Jung-Hwan Song**, Mark L. Brongersma, et. al., “Roadmap on nonlocality in photonic materials and metamaterials,” accepted at **Optical Materials Express**, (2025).
4. Ludovica Guarneri, Thomas Bauer, Qitong Li, **Jung-Hwan Song**, Skyler Selving, Ashley P. Saunders, Fang Liu, Mark L. Brongersma, and Jorik van de Groep, “Dynamic Excitonic Beam Switching with Atomically-Thin Binary Blazed Gratings,” **Advanced Optical Materials** **13**(15), (2025).
5. Lauren Hoang, Marc Jaikissoo, Cagil Koroglu, Zhepeng Zhang, Robert Bennett, **Jung-Hwan Song**, Jerry Yang, Jung-Soo Ko, Mark L. Brongersma, Krishna Saraswat, Eric Pop, Andrew Mannix, “Understanding the Impact of Contact-Induced Strain on the Electrical Performance of Monolayer WS₂ Transistors,” **Nano Letters**, (2024).
6. Ludovica Guarneri, Qitong Li, Thomas Bauer, **Jung-Hwan Song**, Ashley P Saunders, Fang Liu, Mark L Brongersma, Jorik van de Groep, “Temperature-Dependent Excitonic Light Manipulation with Atomically Thin Optical Elements,” **Nano Letters**, (2024).
7. Brandon Born, Sung-Hoon Lee, **Jung-Hwan Song**, Jeong Yub Lee, Woong Ko, Mark L. Brongersma, “Off-axis Metasurfaces for Folded Flat Optics,” **Nature Communications**, (2023).
8. **Jung-Hwan Song**, Philippe Lalanne, Min-Kyo Seo, and Mark L. Brongersma, “Transfer Matrix Method-Compatible Model for Metamaterial Stacks,” **ACS Photonics**, (2023).

9. Qitong Li, **Jung-Hwan Song**, Fenghao Xu, Jorik van de Groep, Jiho Hong, Alwin Daus, Yan Joe Lee, Amalya C. Johnson, Eric Pop, Fang Liu, and Mark L. Brongersma, "A Purcell-enabled monolayer semiconductor free-space optical Modulator," **Nature Photonics**, (2023).
10. Jorik van de Groep, Qitong Li, **Jung-Hwan Song**, Pieter G. Kik, and Mark L. Brongersma, "Impact of substrates and quantum effects on exciton line shapes of 2D semiconductors at room temperature," **Nanophotonics** **0**, (2023).
11. Anqi Ji, **Jung-Hwan Song**, Qitong Li, Fenghao Xu, Ching-Ting Tsai, Richard C. Tiberio, Bianxiao Cui, Philippe Lalanne, Pieter G. Kik, David A. B. Miller, and Mark L. Brongersma, "Quantitative phase contrast imaging with a nonlocal angle-selective metasurface," **Nature Communications** (2022).
12. Qitong Li, Jorik van de Groep, Adam White, **Jung-Hwan Song**, Scott Longwell, Polly Fordyce, Stephen R. Quake, Pieter G. Kik, Mark L. Brongersma, "Metasurface optofluidics for dynamic control of light fields," **Nature Nanotechnology** (2022).
13. **Jung-Hwan Song**, Jorik van de Groep, Soo Jin Kim, and Mark L. Brongersma, "Non-local metasurfaces for spectrally decoupled wavefront manipulation and eye tracking," **Nature Nanotechnology** **16**(11), 1224-1230 (2021).
14. Bo Zhao, **Jung-Hwan Song**, Mark L. Brongersma, Shanhui Fan, "Atomic-Scale Control of Coherent Thermal Radiation," **ACS Photonics** **8**(3), 872-878 (2021).
15. **Jung-Hwan Song**, Søren Raza, Jorik van de Groep, Ju-Hyung Kang, Qitong Li, Pieter G Kik, Mark L. Brongersma, "Nanoelectromechanical modulation of a strongly-coupled plasmonic dimer," **Nature Communications** **12**(1), 1-7 (2021).
16. Christian R Ocier, Corey A Richards, Daniel A Bacon-Brown, Qing Ding, Raman Kumar, Tanner J Garcia, Jorik Van de Groep, **Jung-Hwan Song**, Austin J Cyphersmith, Andrew Rhode, Andrea N Perry, Alexander J Littlefield, Jinlong Zhu, Dajie Xie, Haibo Gao, Jonah F Messinger, Mark L. Brongersma, Kimani C Toussaint, Lynford L Goddard, Paul V Braun, "Direct laser writing of volumetric gradient index lenses and waveguides," **Light: Science & Applications** **9**(1), 1-14 (2020).
17. Mark Lawrence, David R Barton, Jefferson Dixon, **Jung-Hwan Song**, Jorik van de Groep, Mark L. Brongersma, Jennifer A Dionne, "High quality factor phase gradient metasurfaces," **Nature Nanotechnology** **15**(11), 956-961 (2020).
18. Jorik van de Groep, **Jung-Hwan Song**, Umberto Celano, Qitong Li, Pieter G Kik, Mark L. Brongersma, "Exciton resonance tuning of an atomically thin lens," **Nature Photonics** **14**, 426-430 (2020).
19. Hang Feng, Qitong Li, Weiping Wan, **Jung-Hwan Song**, Qihuang Gong, Mark L. Brongersma, Yan Li, "Spin-switched three-dimensional full-color scenes based on a dielectric meta-hologram," **ACS Photonics** **6**(11), 2910-2916 (2019).
20. Michael Yannai, Elhanan Maguid, Arkady Faerman, Qitong Li, **Jung-Hwan Song**, Vladimir Kleiner, Mark L. Brongersma, Erez Hasman, "Order and Disorder Embedded in a Spectrally Interleaved Metasurface," **ACS Photonics** **5**(12), 4764 (2018).
21. Michael Yannai, Elhanan Maguid, Arkady Faerman, Qitong Li, **Jung-Hwan Song**, Vladimir Kleiner, Mark L. Brongersma, Erez Hasman, "Spectrally interleaved topologies using geometric phase metasurfaces," **Optics Express** **26**(23), 31031 (2018).
22. Chun-Ho Lee, Youngrok Kim, **Jung-Hwan Song**, Ho-Seok Ee, Min-Soo Hwang, Kwang-Yong Jeong, Hong-Gyu Park, Takhee Lee, Min-Kyo Seo, "Near-Ultraviolet Structural Colors Generated by Aluminum Nanodisk Array for Bright Image Printing," **Adv. Opt. Mater.** **6**, 1800231 (2018).
23. Jungheum Yun, Haemi Lee, ChaeWon Mun, Junghoon Jahng, William A. Morrison, Derek B. Nowak, **Jung-Hwan Song**, Dong-Kwon Lim, Tae-Sung Bae, Hyung Min Kim, Nam Hoon Kim, Sang Hwan Nam, Jongwoo Kim, Min-Kyo Seo, Dong-Ho Kim, Sung-Gyu Park, and Yung Doug Suh, "Fabrication and near-field visualization of a wafer-scale dense plasmonic nanostructured array," **RSC Adv.** **8**, 6444–6451 (2018).
24. Min-Soo Hwang, Ha-Reem Kim, Kyoung-Ho Kim, Kwang-Yong Jeong, Jin-Sung Park, Jae-Hyunk Choi, Ju-Hyung Kang, Jung Min Lee, Won Il Park, **Jung-Hwan Song**, Min-Kyo Seo, and Hong-Gyu Park, "Switching of photonic crystal lasers by graphene," **Nano Letters** **17**(3), 1892 (2017).

25. Ho-Jin Jeong, Dongha Kim, **Jung-Hwan Song**, Kwang-Yong Jeong, and Min-Kyo Seo, "Resonant magneto-optic Kerr effects of a single Ni nano-rod in the Mie scattering regime," *Optics Express* **24**, 16904 (2016).
26. Yoon-Jong Moon, Daeyoung Moon, Jeonghwan Jang, Jin-Young Na, **Jung-Hwan Song**, Min-Kyo Seo, Sunghye Kim, Dukkyu Bae, Eun Hyun Park, Yongjo Park, Sun-Kyung Kim, and Euijoon Yoon, "Microstructured air cavities as high-index contrast substrates with strong diffraction for light-emitting diodes," *Nano Letters* **16**(5), 3301 (2016).
27. Hoon Jang, Indra Karnadi, Putu Pramudita, **Jung-Hwan Song**, Ki-Soo Kim, and Yong-Hee Lee, "Sub-microWatt threshold nanoisland lasers," *Nature Communications* **6**, 8276 (2015).
28. **Jung-Hwan Song**, Eun-Khwang Lee, Kwang-Yong Jeong, Ju-Hyung Kang, Hong-Gyu Park, and Min-Kyo Seo, "Resonant light scattering from a single dielectric nano-antenna formed by electron beam-induced deposition," *Scientific Reports* **5**, 10400 (2015).
29. **Jung-Hwan Song**, Jisu Kim, Hoon Jang, In Yong Kim, Jonghwa Shin, Jung H Shin, and Yong-Hee Lee, "Fast and bright spontaneous emission of Er³⁺ ions in metallic nanocavity," *Nature Communications* **6**, 7080 (2015).
30. Jinhyung Kim, **Jung-Hwan Song**, Kwang-Yong Jeong, Ho-Seok Ee, and Min-Kyo Seo, "Full three-dimensional power flow analysis of a single-emitter-plasmonic-nanoantenna system," *Optics Express* **23**(9), 11080 (2015).
31. Hongchul Sim, Hee-Jin Lim, **Jung-Hwan Song**, Myung-Ki Kim, and Yong-Hee Lee, "Plasmonic nano-comb structures for efficient large-area second harmonic generation," *Optics Express* **22**(14), 17116 (2014).
32. **Jung-Hwan Song**, Eun-Khwang Lee, Kwang-Yong Jeong, and Min-Kyo Seo, "Design of plasmonic nano-antenna for total internal reflection fluorescence microscopy," *Optics Express* **21**(20), 23036 (2013).
33. **Jung-Hwan Song**, Jonghwa Shin, Hee-Jin Lim, Yong-Hee Lee, "Optical recoil of asymmetric nano-optical antenna," *Optics Express* **19**(16), 14929 (2011).
34. Byeong-Hyeon Ahn, Ju-Hyung Kang, Myung-Ki Kim, **Jung-Hwan Song**, Bumki Min, Ki-Soo Kim, and Yong-Hee Lee, "One-dimensional parabolic-beam photonic crystal laser," *Optics Express* **18**(6), 5654 (2010).

Selected granted patents

1. **Jung-Hwan Song**, and Mark L. Brongersma, "Guided mode resonance device for optical beam tapping and imaging without rainbows," *US Patent* 10,890,772, USA (2021).
2. Min-Kyo Seo, **Jung-Hwan Song**, and Eun-Khwang Lee, "Fabrication technique for nano-optical structures using electron beam induced deposition," **10-2014-0172303**, Korea (2014).

Filed patents

1. **Jung-Hwan Song**, Junghyun Park, and Mark L. Brongersma, "META-OPTICS AND ELECTRIC DEVICE INCLUDING THE SAME," *US Patent* Application no. 17959836, USA (2023).
2. Skyler Selvin, Mark L. Brongersma, Majid Esfandyarpour, and **Jung-Hwan Song**, "Acoustically modulated opto-mechanical resonators," *US Patent* Application no. 18/144090, USA (2023).
3. Mark L. Brongersma, Qitong Li, Jorik van de Groep, and **Jung-Hwan Song**, "Geometric-phase metasurface optofluidics for microlens-free planar light-field displays," *US Patent* Application no. PCT/US2022/271343, USA (2022).
4. Mark L. Brongersma, Qitong Li, Jorik van de Groep, and **Jung-Hwan Song**, "Geometric-phase metasurface optofluidics for dynamic on-demand flat optics and ultra-compact refractometers," *US Patent* Application no. PCT/US2022/271350, USA (2022).
5. Mark L. Brongersma, Qitong Li, Jorik van de Groep, and **Jung-Hwan Song**, "Metasurface optofluidics for reflective displays integrated on transparent substrate," *US Patent* Application no. PCT/US2022/271354, USA (2022).

6. Anqi Ji, Mark L. Brongersma, and **Jung-Hwan Song**, “High-quality-factor metasurface for phase contrast imaging and spatial frequency filtering,” **US Patent** Application no. PCT/US2020/061616, **USA** (2020).

Invited talks in conferences

1. **Jung-Hwan Song**, Jorik van de Groep, Qitong Li, Fenghao Xu, and Mark L. Brongersma, “Creating the next generation of nanostructured optical elements for emerging light-enabled technologies,” **CLEO Pacific Rim 2024**, **Korea** (2024).
2. **Jung-Hwan Song**, Jorik Van de Groep, Qitong Li, Fenghao Xu, and Mark L. Brongersma, “New Generation of Nanophotonic Systems for Emerging Light-Enabled Technologies,” **The 23rd International Meeting on Information Display**, **Korea** (2023).
3. **Jung-Hwan Song**, Qitong Li, Fenghao Xu, Jorik Van de Groep, Fang Liu, Alwin Daus, Eric Pop, and Mark L. Brongersma, “Nonlocal, high-Q metasurfaces for next-generation optical technologies,” **Plasmonics and Nanophotonics Gordon Research Seminar (GRS) 2022**, **USA** (2022).
4. **Jung-Hwan Song**, Jorik van de Groep, Qitong Li, and Mark L. Brongersma, “Creating the Generation of Metasurface-based Flat Optics,” **A3 Metamaterials Forum 2022**, **Korea** (2022).
5. **Jung-Hwan Song**, Jorik van de Groep, Soo Jin Kim, and Mark L. Brongersma, “High-Q, nonlocal metasurfaces for frequency-selective light control and optical eye tracking,” **Optical Society of Korea**, **Korea** (2021).
6. **Jung-Hwan Song**, J. H. Shin, and Yong-Hee Lee, “Purcell effect of very small metallic cavity,” **Photonics West**, **USA** (2015).
7. **Jung-Hwan Song**, Hoon Jang, Jonghwa Shin, J. H. Shin, and Yong-Hee Lee, “Experimental demonstration of fast, bright spontaneous emission in metallic nanocavity,” **Optical Society of Korea**, **Korea** (2015).

Selected awards

1. Postdoctoral Fellowship, *National Research Foundation of Korea* 2016
2. Samsung HumanTech PAPERAWARD, Silver Medal, *Samsung Electronics* 2014
3. Kim Bo-Jeong Scholarships, **KAIST** 2008