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Education

- Aug. 2011~ June 2018 Doctor of Philosophy
Department of Electrical Engineering, SUNY at Buffalo, Buffalo, NY (Advisor: Prof. Qiaoqiang Gan)
- Sep. 2007~ June 2011 Bachelor of Engineering
Electronic Science and Technology, Nankai University, Tianjin, China

Employment

- May.2024~Present Assistant Professor
- Feb. 2023~May. 2024 Postdoctoral Researcher
Material Science Engineering, Physical Science Engineering Division,
KAUST, Thuwal, Saudi Arabia
- Apr. 2021~ Feb. 2023 Research Assistant Professor / Postdoctoral Associate
Department of Electrical Engineering, SUNY at Buffalo, Buffalo, NY (Advisor: Prof. Qiaoqiang Gan)
- Sept. 2020~ Present Chief technology officer
Sunny Clean Water, LLC, Buffalo, NY
- June 2019~ June 2020 Research Assistant Professor / Postdoctoral Associate
Department of Electrical Engineering, SUNY at Buffalo, Buffalo, NY (Advisor: Prof. Qiaoqiang Gan)
- April 2018~ May 2019 Chief technology officer
Sunny Clean Water, LLC, Buffalo, NY
- Jan. 2018~ April 2019 Principal Investigator
Sunny Clean Water, LLC, Buffalo, NY (NSF the Small Business Innovation Research Phase I,
\$225,000)
- Aug. 2015~ Dec. 2016 Teaching Assistant
Department of Electrical Engineering, SUNY at Buffalo, Buffalo, NY

Research Interest

Nanophotonics and optoelectronics for integrated energy devices/systems, such as photodetectors, biosensors, photocatalysis, water desalination purification and condensation, as well as radiative cooling.

Journal Article

Citations over 2700, h-index 24, and i10-index 35 (data from Google Scholar)

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- [44] **H. Song**, W. Wu, J. W. Liang, P. Maity, Y. Shu, N. S. Wang, O. F. Mohammed, B. S. Ooi, Q. Gan, D. Liu, Ultrathin-film titania photocatalyst on nanocavity for CO₂ reduction with boosted catalytic efficiencies, **Global Challenges (IF: 5.135)** **2**, 1800032 (2018).
- [43] **H. Song**,* Y. Liu,* Z. Liu, M. H. Singer, C. Li, A. R. Cheney, D. Ji, L. Zhou, N. Zhang, X. Zeng, Z. Bei, Z. Yu, S. Jiang, Q. Gan, Cold vapor generation beyond the input solar energy limit, **Adv. Sci. (IF: 17.521)**, 1800222 (2018). (* [Contribute equally](#))
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- [41] **H. Song**, S. Jiang, D. Ji, X. Zeng, N. Zhang, K. Liu, C. Wang, Y. Xu, Q. Gan, Nanocavity absorption enhancement for two-dimensional material monolayer systems, **Opt. Express (IF: 3.833)** **23**, 7120 (2015).
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- [39] U. Kunjaram,* **H. Song**,* Y. Liu, B. K. Booker, T. J. Cooke, Q. Gan, A self-salt-cleaning architecture in cold vapor generation system for hypersaline brines, **EcoMat (IF: 12.213)**, e12168 (2022). (* [Contribute equally](#))
- [38] Y. Liu,* **H. Song**,* Z. Bei, L. Zhou, C. Zhao, B. Ooi, Q. Gan, Ultra-thin dark amorphous TiO₂ hollow nanotubes for full spectrum solar energy harvesting and conversion, **Nano Energy (IF: 19.069)** **84**, 105872 (2021). (* [Contribute equally](#))

- [37] L. Zhou,* **H. Song**,* N. Zhang, J. Rada, M. Singer, H. Zhang, B. Ooi, Z. Yu, Q. Gan, Hybrid concentrated radiative cooling and solar heating in a single system, **Cell Reports Phys. Sci.** (IF: 7.832) **2**, 100338 (2021). (* [Contribute equally](#))
- [36] L. Zhou,* **H. Song**,* J. Liang,* M. Singer, M. Zhou, E. Stegenburgs, N. Zhang, C. Xu, T. Ng, Z. Yu, B. S. Ooi, Q. Gan, A polydimethylsiloxane coated metal structure for all-day radiative cooling, **Nat. Sustain.** (IF: 27.157) **2**, 718 (2019). (* [Contribute equally](#))
- [35] C. Deng,* **H. Song**,* J. Parry, Y. Liu, S. He, X. Xu, Q. Gan, H. Zeng, Nanocavity induced light concentration for energy efficient heat assisted magnetic recording media, **Nano Energy** (IF: 19.069) **50**, 750 (2018). (* [Contribute equally](#))
- [34] Z. Xia,* **H. Song**,* M. Kim,* M. Zhou, T.-H. Chang, D. Liu, X. Yin, K. Xiong, H. Mi, X. Wang, F. Xia, Z. Yu, Z. Ma, Q. Gan, Single-crystalline germanium nanomembrane photodetectors on foreign nanocavities, **Sci. Adv.** (IF: 14.957) **3**, e1602783 (2017). (* [Contribute equally](#))
- [33] Z. Liu,* **H. Song**,* D. Ji, C. Li, A. Cheney, Y. Liu, N. Zhang, X. Zeng, B. Chen, J. Gao, Y. Li, X. Liu, D. Aga, S. Jiang, Z. Yu, Q. Gan, Extremely cost-effective and efficient solar vapor generation under non-concentrated illumination using thermally isolated black paper, **Global Challenges** (IF: 5.135) **1**, 1600003 (2017). (* [Contribute equally](#))
- [32] C. Janisch,* **H. Song**,* C. Zhou, Z. Lin, A. Elías, D. Ji, M. Terrones, Q. Gan, Z. Liu, MoS₂ monolayers on nanocavities: enhancement in light–matter interaction, **2D Materials** (IF: 6.861) **3**, 025017 (2016). (* [Contribute equally](#))
- [31] S. Dang, Y. Tian, H. H. Almahfoudh, **H. Song**, O. M. Bakr, B. S. Ooi, Q. Gan, Ground-facing radiative cooling for high power LED lights, **Next Energy** **1**, 100069 (2023).
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Conferences and Proceedings

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- [57] L. Zhou, N. Zhang, C. C. Hsu, M. Singer, X. Zeng, Y. Li, **H. Song**, J. Jornet, Y. Wu, Q. Gan, Plasmonic rainbow chip for super-resolution displacement spectrometer and surface biosensor, Progress in Electromagnetics Research Symposium, April 2024 ([Invited talk](#)).
- [56] D. Tua, R. Liu, L. Zhou, W. Yang, **H. Song**, L. Ying, Q. Gan, A plasmonic “rainbow” chip for intelligent spectrometer, CLEO 2023, STh3R.5.
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- [53] Y. Liu, N. Zhang, D. Tua, Y. Zhu, J. Rada, **H. Song**, Q. Gan, Chemical enrichment in SERS sensing using hydrophobic 3D-assembled metallic nanoparticles, Frontiers in Optics 2022, FTh1D. 2.
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- [11] Q. Gan, K. Liu, **H. Song**, Plasmonic and Nanophotonic Enhanced Organic Photovoltaics: Breaking the Power Conversion Efficiency Barrier, Progress In Electromagnetics Research Symposium, August 2014 ([Invited talk](#)).
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- [6] **H. Song**, S. Jiang, Q. Gan, Nanocavity enhancement for ultra-thin film photo-harvesting, Energy Materials Nanotechnology East Meeting, May 2014 ([Invited talk](#)).
- [5] K. Liu, X. Zeng, S. Jiang, D. Ji, **H. Song**, N. Zhang, Q. Gan, Large-scale lithography-free metasurface with spectrally tunable super absorption, SPIE Sensing Technology + Applications, April 2014.
- [4] X. Zeng, D. Ji, N. Zhang, **H. Song**, Q. Gan, On-chip plasmonic interferometer array for portable multiplexed biosensing system, SPIE Sensing Technology + Applications, April 2014.
- [3] D. Ji, **H. Song**, X. Zeng, H. Hu, K. Liu, N. Zhang, Q. Gan, Broadband absorption engineering of hyperbolic metafilm patterns, SPIE Sensing Technology + Applications, April 2014.
- [2] **H. Song**, K. Liu, X. Zeng, D. Ji, N. Zhang, Q. Gan, Nanocavity absorption enhancement towards atomically thin layers, SPIE Sensing Technology + Applications, April 2014.
- [1] K. Liu, **H. Song**, D. Ji, B. Zhou, X. Zeng, Q. Gan, A. N. Cartwright, Super absorption in ultra-thin photovoltaic films based on strong interference effects, CLEO 2013, JTu4A.64.

Academic Skills

- [1] Nanofabrication: Physical vapor deposition, photolithography, atomic layer deposition.
- [2] Modeling tools: Finite element method (COMSOL), and Finite-difference time-domain (Rsoft).

[3] Optical measurement: Microscope, Fourier transform infrared spectroscope, integrating sphere, and ellipsometer.

[4] Morphological and chemical characterization: Porosity analyzer (BET), and Gas chromatography.

Patents

[5] Q. Gan, Z. Yu, Z. Liu, **H. Song**, M. Singer, C. Li, System and method for solar vapor evaporation and condensation, US Patent 11447400 (2022).

[4] Q. Gan, N. Zhang, **H. Song**, Substrates for surface-enhanced Raman spectroscopy and methods for manufacturing same, US Patent App. 17/609,454 (2022).

[3] Q. Gan, L. Zhou, Z. Yu, **H. Song**, Beam-controlled spectral-selective architecture for a radiative cooler, US Patent App. 17/269,117 (2021).

[2] Q. Gan, **H. Song**, Z. Yu, M. Zhou, Systems and methods for passive cooling and radiator for same, US Patent App. 17/045,415 (2021).

[1] Z. Ma, Z. Xia, G. Qiaoqiang, **H. Song**, Z. Yu, M. Zhou, Optoelectronic devices based on thin single-crystalline semiconductor films and non-epitaxial optical cavities, US Patent 10777700 (2020).

Honors and Awards

- 2017 Recipient of travel grant for Global Grand Challenges Summit
- 2014 The 1st Prize of School of Engineering and Applied Sciences Poster Competition

Academic Experience

- **Presider for CLEO 2019, STu4O • Infrared Photonics & Applications.**
- **Reviewer for *Nat. Commun.*, *Sci. Rep.*, *Nano Res.*, *2D Mater.*, *J. Appl. Phys.*, *Opt. Express*, *Opt. Mater. Express*, *Phys. Lett. B*, *Sol. Energy Mater. Sol. Cells*, *Global Challenges*, *IEEE Photonics J.*, *J. Mater. Chem. A*, *J. Photonics Energy* etc.**