

Hui-Hsin Hsiao 蕭惠心

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## EDUCATION

- 2007/9–2013/2 Doctor of Philosophy (Ph.D.), Graduate Institute of Photonics and Optoelectronics, College of Electrical Engineering and Computer Science, **National Taiwan University**
- 2003/9–2007/6 Bachelor of Science (BS), Department of Physics, **National Taiwan University**

## CURRENT APPOINTMENT

- 2017/9– Assistant Professor, Graduate Institute of Biomedical Optomechanics, **Taipei Medical University**

## EXPERIENCES

- 2016/5–2017/9 Post-Doctoral Fellow, Research Center for Applied Sciences, **Academia Sinica**; Department of Physics, **National Taiwan University**
- 2015/3–2016/3 Post-Doctoral Fellow, Institute of Theoretical Solid State Physics, **Karlsruhe Institute of Technology**, Germany
- 2013/2–2015/2 Post-Doctoral Fellow, Graduate Institute of Photonics and Optoelectronics, College of Electrical Engineering and Computer Science, **National Taiwan University**

## RESEARCH INTERESTS

- Linear and Nonlinear Plasmonics
- Metamaterials and Metasurfaces
- Optical and Electrical Modeling of Optoelectronic Devices: Light Emitting Diodes, Photovoltaics, Lasers, etc.
- Quantum Optics based on Plasmonics and Metasurfaces

## EXPERTISE

- In-house developed parallelized three-dimensional (3D) Finite-Difference Time-Domain (FDTD) program for linear and nonlinear electromagnetic studies
- Hybrid MPI and OpenMP parallelization
- FDTD program combined with 3D Finite Element Poisson and Drift-Diffusion Solver for simultaneous optical and electrical optimization
- Fourier Modal Method; Multipole Expansion

## AWARDS and HONORS

- Feb. 2003 National Taiwan University Presidential Awards
- Feb. 2005 National Taiwan University Presidential Awards
- Jun. 2007 Bachelor Thesis Award, College of Science

### Teaching Assistant

2007–2010 The A-class scholarship of College of Electrical Engineering and Computer Science [Courses: Electromagnetics (twice), applied electromagnetics, fundamentals of electro-optics, optical electronics, and principles and applications of quantum physics]

- Graded homework assignments and examinations
- Held office hour and homework help sessions

### Conference Awards

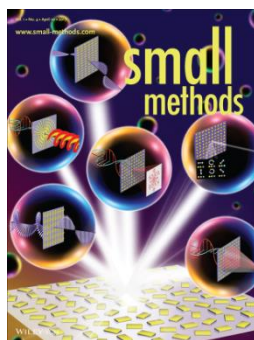
- Dec. 2010 Best Student Paper Award, the 1<sup>st</sup> Cross-Strait Photonics Camp
- Dec. 2012 Student Oral Paper Award, Optics & Photonics Taiwan, International Conference (OPTIC 2012)

### Fellowships

- Jan. 2014 Chieh-Shiung Wu Fellowship (吳健雄獎學金) of the Physical Society of the Republic of China (in recognition of meritorious achievements of female graduate in Physics)
- Dec. 2014 Postdoctoral Research Abroad Program scholarship from the Ministry of Science and Technology
- Mar. 2015 博士後研究人員學術著作獎

## PUBLICATIONS

- [1] **H.-H. Hsiao**, C. H. Chu, and D. P. Tsai, “Fundamentals and applications of metasurfaces,” *Small Methods*, Vol. 1, no. 4, 1600064, 2017. [Selected as front cover article]



- [2] W.-L. Huang, **H.-H. Hsiao**, C.-Y. Lin, M.-R. Tang, and S.-C. Lee, “Waveguide resonances with selectable polarization in an infrared thermal emitter,” *AIP Advances*, Vol. 7, pp. 085122-1–085122-8, 2017. (IF: 1.568, 82/147)
- [3] K. Wang, L. Chen, H. Zhang, **H.-H. Hsiao**, D. P. Tsai, and J. Chen, “Plasmon-enhanced optical nonlinearity for femtosecond all-optical switching,” *Applied Physics Letters*, Vol. 111, pp. 181102-1–181102-4, 2017. (IF: 3.411, 28/147)
- [4] **H.-H. Hsiao**, A. Abass, J. Fischer, R. Alaei, A. Wickberg, M. Wegener, and C. Rockstuhl, “Enhancement of second-harmonic generation in nonlinear nanolaminate metamaterials by nanophotonic resonances,” *Optics Express*, Vol. 24, No. 9, pp. 9651–9659, 2016. (IF: 3.307, Hui-Hsin Hsiao, Taipei Medical University, hhhsiao@tmu.edu.tw)

16/92)

- [5] W.-L. Huang, **H.-H. Hsiao**, M.-R. Tang, and S.-C. Lee, "Triple-wavelength infrared plasmonic thermal emitter using hybrid dielectric materials in periodic arrangement," *Applied Physics Letters*, Vol. 109, no. 6, pp. 063107-1–063107-5, 2016. (IF: 3.411, 28/147)
- [6] **H.-H. Hsiao**, S.-M. Chiou, Y.-P. Chang, and H.-C. Chang, "Broadly Tuning Resonant Wavelengths of Contour Bowtie Nano-Antennas Operating in the Near- and Mid-Infrared," *IEEE Photonics Journal*, Vol. 7, No. 4, pp. 4501108, 2015. (IF: 2.291, 33/92)
- [7] **H.-H. Hsiao**, H.-C. Chang, and Y.-R. Wu, "Design of anti-ring back reflectors for thin-film solar cells based on three-dimensional optical and electrical modeling," *Applied Physics Letters*, Vol. 105, no. 6, pp. 061108-1–061108-5, 2014. (IF: 3.411, 28/147)
- [8] **H.-H. Hsiao**, P.-C. Yeh, H.-H. Wang, T.-Y. Cheng, H.-C. Chang, Y.-L. Wang, and J.-K. Wang, "Enhancing Bright-Field Image of Microorganisms by Local Plasmon of Ag Nanoparticle Array," *Optics Letters*, Vol. 39, No. 5, pp. 1173–1176, 2014. (IF: 3.416, 14/92)
- [9] **H.-H. Hsiao** and H.-C. Chang, "Prediction of Transmission Shape-Resonances in Aperture Arrays with One- or Twofold Mirror-Symmetry Based on a Near-Field Phase Property," *IEEE Journal of Quantum Electronics*, Vol. 50, No. 4, pp. 287–294, 2014. (IF: 1.917, 38/92)
- [10] H.-H. Chen, **H.-H. Hsiao**, H.-C. Chang, W.-L. Huang, and S.-C. Lee, "Double Wavelength Infrared Emission by Localized Surface Plasmonic Thermal Emitter," *Applied Physics Letters*, Vol. 104, No. 8, pp. 083114-1–083114-4, 2014. (IF: 3.411, 28/147)
- [11] P.-Y. Chen, **H.-H. Hsiao**, C.-I. Ho, C.-C. Ho, W.-L. Lee, H.-C. Chang, S.-C. Lee, J.-Z. Chen, and I.-C. Cheng, "Periodic anti-ring back reflectors for hydrogenated amorphous silicon thin-film solar cells," (*OSA*) *Optics Express*, Vol. 22, No. S4, pp. A1128–A1136, 2014. (IF: 3.307, 16/92)
- [12] S.-C. Yang, P.-K. Wei, **H.-H. Hsiao**, P. A. Mante, Y.-R. Huang, I.-J. Chen, H.-C. Chang and C.-K. Sun, "Enhanced detection sensitivity of higher-order vibrational modes of gold nanodisks on top of a GaN nanorod array through localized surface plasmons," *Applied Physics Letters*, Vol. 105, no. 21, pp. 211103-1–211103-5, 2014. (IF: 3.411, 28/147)
- [13] **H.-H. Hsiao**, H.-F. Huang, S.-C. Lee, and H.-C. Chang, "Investigating Far-Field Spectra and Near-Field Features of Extraordinary Optical Transmission through Periodic U to H Shaped Apertures," *IEEE Photonics Journal*, Vol. 4, No. 2, pp. 387–398, 2012. (IF: 2.291, 33/92)
- [14] Y.-C. Chen, **H.-H. Hsiao**, C.-T. Lu, Y.-T. Chang, H.-H. Chen, F.-T. Chuang, S.-Y. Huang, C.-W. Yu, H.-C. Chang, and S.-C. Lee, "Effect of Paired Apertures in a Periodic Hole Array on Higher Order Plasmon Modes," *IEEE Photonics Technology Letters*, Vol. 24, No. 22, pp. 2052–2055, 2012. (IF: 2.375, 32/92)
- [15] S.-C. Yang, H.-P. Chen, **H.-H. Hsiao**, P.-K. Wei, H.-C. Chang, and C.-K. Sun, "Near-field Dynamic Study of the Nanoacoustic Effect on the Extraordinary Transmission in Gold Nanogratings," (*OSA*) *Optics Express*, Vol. 20, No. 15, pp. 16186–16194, 2012. (IF: 3.307, 16/92)
- [16] S.-Y. Huang, H.-H. Chen, **H.-H. Hsiao**, P.-E. Chang, Y.-T. Chang, C.-H. Chen, Y.-W. Jiang, H.-C. Chang, and S.-C. Lee, "Triple Peaks Plasmonic Thermal Emitter with Selectable Wavelength Using Periodic Block Pattern as Top Layer," *IEEE Photonics Technology Letters*, Vol. 24, No. 10, pp. 833–835, 2012. (IF: 2.375, 32/92)
- [17] S.-Y. Huang, **H.-H. Hsiao**, Y.-T. Chang, H.-H. Chen, Y.-W. Jiang, H.-F. Huang, P.-E. Chang, H.-C. Chang, and S.-C. Lee, "Extraordinary Transmission Through a Silver Film Perforated with Bowtie-shaped Aperture Array in Midinfrared Region," *Applied Physics Letters*, Vol. 98, No. 25, pp. 253107-1–253107-3, 2011. (IF: 3.411, 28/147)
- [18] B.-Y. Lin, C.-H. Teng, H.-C. Chang, **H.-H. Hsiao**, J.-K. Wang, and Y.-L. Wang, "Pseudospectral Modeling of Nano-Optics in Ag Sphere Arrays," *Journal of Scientific*

*Computing*, Vol. 45, No. 1–3, pp . 429–446, 2010. (Special Issue in Memory of Professor David Gottlieb) (IF: 1.899, 29/255)

## **BOOK CHAPTERS**

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**H.-H. Hsiao** and D. P. Tsai, *Plasmonic metasurfaces* (Elsevier, Encyclopedia of Interfacial Chemistry: Surface Science and Electrochemistry, Chapter 13248, 2017).

## **JOURNAL REVIEWERS**

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ACS Photonics, Journal of Lightwave Technology, Applied Physics A, Optical and Quantum Electronics

## **SELECTED PRESENTATION**

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- [1] **H.-H. Hsiao**, H. J. Wu, T. L. Chung, W.-Y. Tsai, R. J. Lin, W. H. Lee, and D. P. Tsai, “Giant nonlinearity arising from the vertical split ring resonators,” in *Proceedings of SPIE Optics + Photonics*, San Diego, California, United States, Aug. 6–10, 2017. [Invited talk]
- [2] **H.-H. Hsiao**, J.-W. Chen, Y. H. Chen, H. J. Wu, C. H. Chu, M.-K. Chen, W.-Y. Tsai, T. L. Chung and D. P. Tsai, “Engineering anapole mode for the generation of toroidal dipole moment,” in *Proceedings of META'17, the 8th International Conference on Metamaterials, Photonic crystals and Plasmonics*, Incheon - Seoul, South Korea, July 25–28, 2017. [Invited talk]
- [3] **H.-H. Hsiao**, H.-C. Chang, and Y.-R. Wu, “Design of nano-pattern reflectors for thin-film solar cells based on three-dimensional optical and electrical modeling,” in *Proceedings of Photonics West 2015*, paper 9358-7, San Francisco, California, United States, Feb. 7–12, 2015. [Conference talk]
- [4] **H.-H. Hsiao**, H.-C. Chang, and Y.-R. Wu, “Design of Light Trapping Nanopatterned Solar Cells based on Three-Dimensional Optical and Electrical Modeling,” in *Proceedings of the 14th International Conference on Numerical Simulation of Optoelectronic Devices (NUSOD 2014)*, paper ThA1, Palma de Mallorca, Spain, September 1–4, 2014. [Conference talk]
- [5] **H.-H. Hsiao**, P.-Y. Chen, I.-C. Cheng, H.-C. Chang, and Y.-R. Wu, “Efficiency Enhancement of Thin-Film a-Si:H Solar Cell with Periodic Anti-ring Back Reflector,” in *Abstracts, PVSC 40, the 40<sup>th</sup> IEEE Photovoltaic Specialists Conference*, Denver, Colorado, U.S.A, June 8–13, 2014. [Poster]
- [6] **H.-H. Hsiao**, “Simulating Light Transmission through a Metallic Thin Film Perforated with Complex-Shaped Apertures,” in *Proceedings of Annual Meeting of the Physical Society of Republic of China, 2014 (PSROC 2014)*, paper O7-AS-04, National Chung Hsing University, Taipei, Taiwan, R.O.C., January 21–23, 2014. [Invited talk]
- [7] **H.-H. Hsiao**, H.-H. Chen, P.-W. Wu, S.-C. Lee, and H.-C. Chang, “Metal-Dielectric-Metal Plasmonic Thermal Emitters with Grating Structure,” in *Proceedings of the 6<sup>th</sup> Cross-Strait Ph.D. Student Forum on Photonic Science and Technology*, p. 64, Yangzhou University, Yangzhou, China, October 9–10, 2013. [Conference talk]
- [8] **H.-H. Hsiao**, J.-K. Wang, and H.-C. Chang, “Investigating the Optical Properties of Raman-Enhancing Substrates by Using the Finite-Difference Time-Domain Method with Space-Time Gaussian Excitations,” in *Proceedings of the 2013 Asia-Pacific Radio Science Conference (AP-RASC'13)* (CD-ROM), paper B3c-1, Taipei, Taiwan, R.O.C., September 3–7, 2013. [Conference talk]
- [9] **H.-H. Hsiao**, J.-K. Wang, and H.-C. Chang, “Optical Properties of Raman-Enhancing Substrates,” in *Proceedings of the 33<sup>rd</sup> Progress in Electromagnetics Research Symposium (PIERS 2013)*, Taipei, Taiwan, R.O.C., March 25–28, 2013. [Conference talk]

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- [10] **H.-H. Hsiao** and H.-C. Chang, “Simulating Light Transmission Through a Metallic Thin Film Perforated with 2D Periodic Array of Multiple-slit Apertures,” in *Abstracts, META’13, the 4th International Conference on Metamaterials, Photonic crystals and Plasmonics*, pp. 161–162, Sharjah, United Arab Emirates, March 18–22, 2013. [Conference talk]
- [11] **H.-H. Hsiao** and H.-C. Chang, “Aperture-Shape Symmetry Dependent Characteristics of Light Transmission through a Metallic Thin Film Perforated with 2D Periodic Array of Multiple-Slit Apertures,” in *Proceedings of the 2<sup>nd</sup> Cross-Strait Photonics Camp*, p. 20, Peking University, Beijing, China, September 23–24, 2012. [Conference talk]
- [12] **H.-H. Hsiao** and H.-C. Chang, “Simulating Extraordinary Optical Transmission Through Periodic U to H Shaped Apertures,” in *Book of Abstracts, PECS-X: 10<sup>th</sup> International Symposium on Photonic and Electromagnetic Crystal Structures*, pp. 348–349 (paper #: 0145), Santa Fe, New Mexico, U.S.A., June 3–8, 2012. [Poster]
- [13] **H.-H. Hsiao** and H.-C. Chang, “Investigating Resonance Modes and Metal Losses of Split-Ring Resonators at Optical Frequencies by Using the Finite-Difference Time-Domain Method,” in *Technical Digest of the Sixteenth International Conference on Microoptics (MOC’10)*, pp. 215–216, paper WP64, Hsinchu, Taiwan, R.O.C., October 31–November 3, 2010. [Poster]