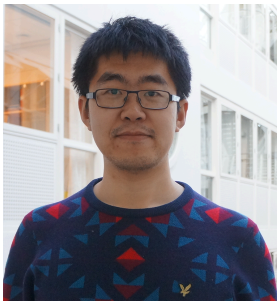
Jin Dai



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Profile

Highly motivated research associate with broad expertise in numerical design, nanofabrication, and characterization of optical devices from visible to infrared applications.

Education

Ph.D.

Kungliga Tekniskahögskolan — *Sweden*

Doctor in Physics — *2012-2016*

- **Thesis title:** Near-Field Radiative Heat Transfer betweeen Plasmonic Nanostructures

Master

Universiteit Gent — *Belgium*

Erasmus Mundus MSc in Photonics — *2010-2011*

Kungliga Tekniskahögskolan — *Sweden*

Erasmus Mundus MSc in Photonics — *2011-2012*

- **Thesis title**: Design and Characterization of Plasmonic Absorbers Based on Gold Nano-spheres

Bachelor

Dalian University of Technology — *China*

Bachelor of Science — *2006-2010*

- **Major**: Optical Information Science and Technology
- **Minor**: Electronic Science and Technology
- **Thesis title:** Design of microring resonator operating in the visible regime

Award

Recognising recent advances in photonics: the JOPT Highlights of 2014

Journal of Optics 2016 Research Excellence Award

Research Experience

Doctoral Projects

Kungliga Tekniskahögskolan & Syddansk Universitet — *2012-2016*

- Design, fabrication, and characterization of an ultrabroadband plasmonics light absorber in the visible regime.
- Design and fabrication of an ultrathin plasmonic quaterwave plate.
- Design and fabrication of highly directional and ultranarrow band infrared thermal emitter for greenhouse gas sensing.
- Design of highly directional thermal emitters at 1.7 micron based on refractory material for GaSb TPV systems.
- Development of MATLAB code based on *Rigorous Coupled Wave Analysis* for simulating near- and far-field thermal radiation and heat transfer between arbitrary 1D and 2D periodic nanostructures.
- Design of metasurfaces for enhanced near-field radiative energy transfer for nano-gap TPV applications.

Master Projects

Universiteit Gent & Vrije Universiteit Brussel *2010-2011*

- Design and simulation of a 40 Gb/s optical communication link for over 1000 km transmission, which was then extended to incorporate a WDM using Rsoft.
- Design of a triangular signal generator with a tunable rise time using SmartSpice.
- Design, fabrication, and characterization of a Seebeck dector.

Skills & Expertise

Numerical skill

MATLAB: self-develop RCWA code for reflection, transmission, absorption and near/far-field thermal radiation calculation.

COMSOL Multiphysics: expert in RF module for light reflection, transmission, absorption calculation, photonic band diagram calculation using Mathematic module base on weak form of Maxwell's equations, Mode Analysis module for waveguide calculation, and COMSOL MATLAB Simulink.

MEEP: photonic band diagram, light scattering and thermal emission calculation.

Cluster: experienced in running parallel COMSOL, MATLAB, and MEEP on unix based clusters.

Nanofabrication process

Electron-beam lithography, Photolithography, Focused Ion beam, ICP, Wet Etching, PECVD, Electron-beam evaporation, Thermal evaporation.

Characterization technique

SEM, FTIR, Optical ellipsometry, House-built reflection, transmission, and thermal emission measurement setups.

Operating system and software

Linux, MAC OS X, Windows, LaTeX(expert user), Rsoft, L-Edit, SmartSpice, Blender.

Language

English, Native Chinese, C, HTML, Basic Swedish.

Personal

Personality

Open-minded, Active and good learner, Good at communication and with good sense of humor, Efficient team worker.

Hobbies

Basketball, Hiking, Running, Reading, Traveling.

Publications

[1] **J. Dai**, S. A. Dyakov, and M. Yan, "Enhanced near-field radiative heat transfer between corrugated metal plates: Role of spoof surface plasmon polaritons," Phys. Rev. B **92**, 035419 (2015).

[2] **J. Dai**, S. A. Dyakov, and M. Yan, "Radiative heat transfer between two dielectric-filled metal gratings," Phys. Rev. B **93**, 155403 (2016).

[3] **J. Dai**, S. A. Dyakov, S. I. Bozhevolnyi, and M. Yan, "Near-field radiative heat transfer between metasurfaces: A full-wave study based on two-dimensional grooved metal plates," Phys. Rev. B **94**, 125431 (2016).

[4] **J. Dai**, F. Ding, S. I. Bozhevolnyi, and M. Yan, "Ultrabroadband super-Planckian radiative heat transfer with profile-patterned hyperbolic metamaterial," arXiv preprint arXiv:1609.04319 (2016).

[5] **J. Dai**, F. Ye, Y. Chen, M. Muhammed, M. Qiu, and M. Yan, "Light absorber based on nano-spheres on a substrate reflector," Opt. Express **21**, 6697–6706 (2013).

[6] F. Ding, **J. Dai**, Y. Chen, J. Zhu, Y. Jin, and S. I. Bozhevolnyi, "Broadband near-infrared metamaterial absorbers utilizing highly lossy metals," Sci Rep. **6**, 39455 (2016).

[7] S. A. Dyakov, **J. Dai**, M. Yan, and M. Qiu, "Near field thermal memory based on radiative phase bistability of VO_2," J. Phys. D: Appl. Phys. **48**, 305104(2016).

[8] S. A. Dyakov, **J. Dai**, M. Yan, and M. Qiu, "Thermal self-oscillations in radiative heat exchange," Appl. Phys. Lett. **106**, 064103 (2015).

[9] Y. Chen, **J. Dai**, M. Yan, and M. Qiu, "Metal-insulator-metal plasmonic absorbers: influence of lattice," Opt. Express **22**, 30807–30814 (2014).

[10] S. A. Dyakov, **J. Dai**, M. Yan, and M. Qiu, "Thermal radiation dynamics in two parallel plates: The role of near field," Phys. Rev. B **90**, 045414 (2014).

[11] M. Yan, **J. Dai**, and M. Qiu, "Lithography-free broadband visible light absorber based on a mono-layer of gold nanoparticles," J. Opt. **16**, 025002 (2014).

[12] X. Chen, Y. Chen, **J. Dai**, M. Yan, D. Zhao, Q. Li, and M. Qiu, "Ordered Au nanocrystals on a substrate formed by light-induced rapid annealing," Nanoscale **6**, 1756–1762 (2014).

[13] Y. Chen, **J. Dai**, M. Yan, and M. Qiu, "Honeycomb-lattice plasmonic absorbers at NIR: anomalous high-order resonance," Opt. Express **21**, 20873–20879 (2013).