

Chatdanai Lumdee

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BIO

Chatdanai started his research career when he graduated from the Faculty of Engineering, Chulalongkorn University in Thailand with a major in nano-engineering (first class honors). He then took a fellowship from CREOL/The College of Optics and Photonics in Orlando, FL to join a PhD program at one of the world's foremost institutions for research and education in optics and photonics. At CREOL, he worked under the supervision of Prof. Pieter G. Kik where his research focused on optical phenomena at the nanoscale. Upon completion of his degree, he decided to continue his postdoctoral training in another continent and joined the group led by Prof. Alexandre Dmitriev at the University of Gothenburg/Chalmers in Sweden. He is currently working on a highly collaborative EU funded project with the aim to develop a technological platform for the next generation of data storage units through nano-optics and nanomagnetism.



CAREERS

Postdoctoral Research Scientist

04/2016 – present

Department of Physics, University of Gothenburg/Chalmers – Gothenburg, Sweden

Research topics: magnetoplasmonics, nanomagnetism

Research description: We are exploring the interplay between nanoscale optics and magnetism. The project aims to use composite nanostructures to improve magneto-optic effects compared to those found in traditional magnetic materials. Most of the samples are fabricated based on the technique of hole-mask colloidal lithography (HCL) where short-range ordered nanostructures up to tens of centimeter-square in area can be achieved for ensemble measurement. The samples are structurally characterized with techniques such as transmission/scanning electron microscopy and atomic force microscopy. Optical and magneto-optical responses are characterized using MOKE/Faraday measurement. Simulations and data analysis were carried out using Lumerical and Python.

*The study could lead to a new generation of hard drives that are 100 times smaller and 10,000 times faster.

Graduate Research Scientist

08/2010 – 01/2016

NanoPhotonics and Near-field Optics Group, CREOL/The College of Optics and Photonics – Orlando, FL

Research topics: nanophotonics, surface plasmon resonances, gap-plasmons

Research description: I spent my time studying how nanoscale objects and light interact e.g. near-field/far-field responses and surface-enhanced optical phenomena with various microscopy and spectroscopy techniques on single particle level, including optical brightfield/darkfield, (surface enhanced) Raman scattering and photoluminescence. Electromagnetic simulation software (CST MICROWAVE STUDIO) was employed in modelling the structures we investigated. Other numerical software such as MATLAB, Mathematica, MathCAD, and Origin were used to process and to analyze the data. During the time, I also had hands-on experience with standard micro/nano fabrication and characterization techniques such as thin-film deposition, scanning electron microscopy, and ellipsometry.

*This research area is the core foundation of several emerging technologies including single-molecular sensing, surface enhanced photocatalysis, and heat-assisted magnetic recording.

EDUCATION

Ph.D. in Optics and Photonics

08/2010 – 12/2015

CREOL/The College of Optics and Photonics, University of Central Florida – Orlando, FL

GPA: 3.95/4.00

B.Eng. in Nano Engineering (major in Nanoelectronics)

08/2006 – 05/2010

Chulalongkorn University – Bangkok, Thailand

GPA: 3.91/4.00, Graduated with First Class Honors

SELECTED AWARDS

SPIE – The International Society for Optical Engineering

- 2014 Optics and Photonics Education Scholarship
- 2013 Student Author Travel Grant
- 2012 Student Chapter Officer Travel Grant

University of Central Florida

- 2013–2015 College of Graduate Studies – Research Excellence Fellowship
- 2012/13/14 College of Graduate Studies – Conference/Travel Fellowship
- 2013/14 Student Government Association – Conference Registration & Travel Grant
- 2010–2011 CREOL – Graduate Student Fellowship

PROFESSIONAL SERVICES

- SPIE UCF Student Chapter President (2012–2013)
- Volunteer teaching assistant – Electronics II (EEL 4309) at UCF (Summer 2013)
- Reviewed and assisted in reviewing articles for scientific journals (ACS Nano, ACS Photonics, Applied Physics Letters, The Journal of Physical Chemistry)

JOURNAL PUBLICATIONS <<Impact Factor as of 2016>>

- [7] C. Lumdee and P. G. Kik, “**Omnidirectional Excitation of Sidewall Gap-Plasmons in a hybrid Gold-Aluminum Nanopore Structure**,” *APL Photonics* 2016, 1, 031301. <<IF = N/A>>
- [6] S. Novak, C. Li, N. Borodinov, Z. Han, C. Monmeyran, N. Patel, Q. Du, C. Lumdee, P. G. Kik, W. Deng, A. Agarwal, J. Hu, I. Luzinov, K. Richardson, “**Electrospray deposition of uniform thickness Ge₂₃Sb₇S₇₀ and As₄₀S₆₀ chalcogenide glass films**,” *Journal of Virtual Experiments* 2016, 54379R3. <<IF = 1.325>>
- [5] C. Lumdee, B. Yun, and P. G. Kik, “**Effect of Surface Roughness on Substrate-tuned Gold Nanoparticle Gap Plasmon Resonances**,” *Nanoscale* 2015, 7, 4250-4255. <<IF = 7.760>>
- [4] S. Toroghi, C. Lumdee, and P. G. Kik, “**Heterogeneous Plasmonic Trimers for Enhanced Nonlinear Optical Absorption**,” *Appl. Phys. Lett.* 2015, 106, 103102. <<IF = 3.142>>
- [3] C. Lumdee, B. Yun, and P. G. Kik, “**Gap-Plasmon Enhanced Gold Nanoparticle Photoluminescence**,” *ACS Photonics* 2014, 1, 1224-1230. **(Cover article)** <<IF = 5.404>>
- [2] C. Lumdee, B. Yun, and P. G. Kik, “**Wide-band Spectral Control of Au Nanoparticle Plasmon Resonances on a Thermally and Chemically Robust Sensing Platform**,” *J. Phys. Chem. C* 2013, 117, 19127-19133. <<IF = 4.509>>
- [1] C. Lumdee, S. Toroghi, and P. G. Kik, “**Post-Fabrication Voltage Controlled Resonance Tuning of Nanoscale Plasmonic Antennas**,” *ACS Nano* 2012, 6, 6301-6307. <<IF = 13.334>>

CONFERENCE PRESENTATIONS (with a conference proceeding)

- *SPIE Optics + Photonics*, 2014 – San Diego, CA (**Invited talk**)
C. Lumdee and P. G. Kik, “**Numerical Prediction of the Effect of Nanoscale Surface Roughness on Film-coupled Nanoparticle Plasmon Resonances**,” *Proc. 9163-91631I* (2014).
- *OSA Frontiers in Optics*, 2013 – Orlando, FL
C. Lumdee, B. Yun, and P. G. Kik, “**Controlled Surface Plasmon Resonance on Stable Substrates as an Optimized Sensing Platform**,” *FTh3C. 8* (2013).
- *OSA Frontiers in Optics*, 2013 – Orlando, FL
S. Toroghi, C. Lumdee, and P. G. Kik, “**Extreme Plasmon Resonant Field Enhancement in Multi-material Nanoparticle Trimers**,” *FTh3C. 3* (2013).
- *SPIE Optics + Photonics*, 2013 – San Diego, CA
C. Lumdee, B. Yun, and P. G. Kik, “**Optical Characteristic and Numerical Study of Gold Nanoparticles on Al₂O₃ coated Gold Film for Tunable Plasmonic Sensing Platforms**,” *Proc. 8809-88091S* (2013).
- *SPIE Optics + Photonics*, 2013 – San Diego, CA
S. Toroghi, C. Lumdee, and P. G. Kik, “**Cascaded Plasmon Resonances Multi-material Nanoparticle Trimers for Extreme Field Enhancement**,” *Proc. 8809-88091M* (2013).
- *SPIE Optics + Photonics*, 2012 – San Diego, CA
C. Lumdee and P. G. Kik, “**Voltage Controlled Nanoparticle Plasmon Resonance Tuning through Anodization**,” *Proc. 8457-84570T* (2012).

OTHER PRESENTATIONS + POSTERS

- [4 talks] C. Lumdee, “Nano-optics with a spin: interplay between light and magnetism at the nanoscale,” *Seminar at [Chulalongkorn University, Naresuan University (in Thai), King Mongkut's Institute of Technology Ladkrabang, King Mongkut's University of Technology Thonburi (mini-seminar)]*, Feb 2017, Thailand.
- C. Lumdee and P. G. Kik, “Manipulating Light at the Nanoscale: Gap-plasmon Enhanced Optical Processes,” *Seminar at Mahidol University*, Feb 2016, Bangkok, Thailand.
- C. Lumdee, S. Toroghi, B. Yun, and P. G. Kik, “All-inorganic Substrate-tuned Nanoparticle Plasmon Resonances for Robust Biochemical Sensors,” *CREOL Affiliates Day 2014*, Orlando, FL, USA.
- C. Lumdee, “Film-coupled Nanoparticle Structures for Controlled Plasmonic Resonances,” *OSA UCF Chapter – CREOL Graduate Research Symposium 2013 (student talk series)*, Orlando, FL, USA.
- C. Lumdee, B. Yun, and P. G. Kik, “Wide-band Spectral Control of Au Nanoparticle Plasmon Resonances on a Thermally and Chemically Robust Sensing Platform,” *NanoFlorida 2013*, Gainesville, FL, USA.
- C. Lumdee, B. Yun, and P. G. Kik, “Post-Fabrication Voltage Controlled Resonance Tuning of Gold Nanoparticles,” *CREOL Affiliates Day 2012*, Orlando, FL, USA.
- S. Toroghi, C. Lumdee, and P. G. Kik, “Design and Performance of Cascaded Plasmonic Metamaterials for Optical Switching,” *Gordon Research Conference on Plasmonics 2012*, Waterville, ME, USA.
- P. G. Kik, A. Ghoshal, and C. Lumdee, “Spatially Resolved Leakage Radiation Spectroscopy of Integrated Plasmonic Microresonators,” *SPIE Defense and Security 2011*, Orlando, FL, USA.
- C. Srichan, C. Lumdee, A. J. Medford, T. Lomas, and A. Tuantranont, “Controlled Alignment of Electrospun Nanofiber on Inkjet Printed Patterns on Flexible Substrate,” the 3rd *IEEE International NanoElectronics Conference (INEC) 2010*, Hong Kong, China.