Minh Tuan Trinh, Ph.D.

Electrical Engineering and Computer Science
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EMPLOYMENT HISTORY

Adjunct Associate Research Scientist, **University of Michigan** **1/2017-present**
Associate Research Scientist, **Columbia University** **7/2014-12/2016**
Postdoctoral Fellow, **Columbia University** **1/2013-6/2014**
Postdoctoral Fellow, **University of Texas at Austin** **8/2012-12/2012**
Postdoctoral Fellow, **University of Amsterdam** **7/2010-8/2012**

Research Interests: To develop (ultrafast) spectroscopic techniques for investigating novel photo-physical and chemical properties in quantum materials, including small organic molecules and nanostructured inorganic semiconductors, perovskites, 2D materials, and photonic devices. Study nonlinear dynamics of magneto-optics.

EDUCATION

Ph.D. in Opto-electronic Materials, Department of Chemical Engineering **2006-2010**
Delft University of Technology, Delft, the Netherlands
(Ranked #54 and #59 by the QS and Times Higher Education World Rankings)

M.S. in Nonlinear Optics and Optical Materials, Department of Physics **2002-2005**
Chungbuk National University, Cheongju, South Korea

B.S. in Physics, Quantum Optics, Department of Physics **1998-2002**
College of Natural Science, Vietnam National University, Hanoi, Vietnam

RESEARCH EXPERIENCE

University of Michigan, Ann Arbor, MI **1/2017-present**

Department of Electrical Engineering and Computer Science, Center for Dynamic Magneto-Optics.

- Leading research in nonlinear optics, magneto-optic phenomena with relevance to electromagnetic energy conversion, magnetic dipole scattering, and THz generation.
- Managing the high energy ultrashort pulse carrier-envelope-phase (CEP) stabilized laser system (~$1 million), designed and perform experiments on nonlinear magneto-optics effects.

Columbia University, New York, NY **1/2013-12/2016**

Department Chemistry, Advisor: Prof. Xiaoyang Zhu; Active user at the Center for Functional Nanomaterials, Brookhaven National Laboratory, New York.

- Lead-halide Perovskites: Contributed to a deeper understanding of photo-physical properties of Lead-halide Perovskite, a promising material for a low cost and highly efficient solar cell. Provided direct evidence for hole traps on the surfaces and exciton trap states below gap of 2D and 3D perovskite crystals. Demonstrated the dependence of the density of trap states on the chemical compositions for 3D perovskite crystals. Studied the role of organic cations on the extraordinary physical properties of band-edge carriers and their charge carrier nature. Directly probed large polarons formation after photo-excitation rather than exciton or free carrier formation.
- Non-fullerene Organic Photovoltaics (OPV): Demonstrated the high performance of non-fullerene OPV based on helical molecular semiconductors with a record of power conversion

efficiency. Probed ultrafast electron and hole transfer (sub-picosecond) and charge separation upon photo-excitation with a high charge yield contributed from both the donor and acceptor.

- Non-fullerene Organic Photodiodes (OPD): Demonstrated the high performance of OPD using a rigid and conjugated macrocycle as the electron acceptor. Determined that the high OPD performance comes from a very low dark current and an efficient ultrafast electron/hole transfer at the interfaces.
- Singlet Fission (SF): First demonstrated intra- to intermolecular SF in oligoene molecules with different conjugation lengths (SF has great potential for highly efficient OPV applications). Discovered a strongly correlated triplet pair from intramolecular SF in bipentacene molecules and harvested triplet excitons in bipentacene molecule by covalently coupled to an iron-oxide cluster.
- Small Conjugated Organic Molecules: Discovered ultrafast intersystem crossing in oligodiacetylene co-micelles and demonstrated efficient blue-emitting cyclostilbenes for organic light-emitting diode (OLED) applications. Investigated ultrafast exciton dynamics in covalent donor-acceptor molecules.
- Nanostructured Graphene: Demonstrated efficient many-body interactions in graphene quantum dots and negligible many-body interactions in graphene nanoribbons. Simulated Auger recombination in graphene quantum dots using Stochastic model.
- Inorganic Quantum Dots (QDs): First proved that hot carriers break the QD symmetry and resulted in the transient Stark effect in the optical transitions.
- Super-atom solids: Studied physical properties of low bandgap semiconductors which are new class of materials made of atomically precise nanoclusters (super-atoms). Desirable physical properties of these materials can be achieved by encoding the corresponding properties in the building blocks, chemical intercalation, and manipulate their coupling via ligands.

University of Texas at Austin. **8/2012-12/2012**

Department of Chemistry and Biochemistry, Advisor: Prof. Xiaoyang Zhu.

- Fabrication, surface characterization, and studied ultrafast carrier dynamics of thin films of nanocrystals and small organic semiconducting molecules.

University of Amsterdam, the Netherlands. **2010-2012**

Institute of Physics (Van der Waals Zeeman Institute); Advisor: Prof. Tom Gregorkiewicz.

- Demonstrated the direct multiple exciton generation in adjunction Si nanocrystals embedded in a SiO_2 matrix upon the absorption a single high energy photon, which could be applied to create high efficiency silicon solar cells.
- Revealed the free charge nature of Auger recombination in Si nanocrystals.
- Studied the optical properties of Si nanocrystals and rare-earth ion doped Si nanocrystals using ultrafast pump-probe and photoluminescence spectroscopy (at room and cryogenic temperatures), and energy transfer from Si nanocrystals to rare-earth ions.
- Grew Si nanocrystals embedded in SiO_2 by radio-frequency co-sputtering followed by high-temperature annealing.

Delft University of Technology, the Netherlands **2006-2010**

Department of Chemical Engineering. Foundation for Fundamental Research on Matter (FOM) Research Fellow, Optoelectronic Materials group; Advisor: Prof. Laurens Siebbeles;

- Developed a versatile femtosecond transient absorption setup able to measure both ground and excited state absorptions, ultralow signal, and able to probe at the pump energy degeneracy and built an optical pump-THz probe setup.

- Proved the existence of multiple exciton generation (MEG) in PbSe quantum dots. Demonstrated the anomalous independence of MEG yield on different group IV-VI quantum dot architectures.
- Discovered evidence that resolved the controversy in the assignment of the optical transitions in PbSe quantum dots.
- Studied the ultrafast dynamics of excitons and charges in polythiophene P3HT/ PCBM bulk heterojunction using ultrafast transient absorption spectroscopy.
- Synthesized PbSe nanocrystals by the hot injection method (wet chemical synthesis).

Chungbuk National University, South Korea **2002-2005**

Department of Physics; Research Assistant in the Non-linear Optics group; Advisor: Prof. Ki-Soo Lim.

- Grew rare-earth and transition metal ion doped glasses and studied the optical properties (nanoparticle formation and spectroscopy) of the glasses after intense femtosecond laser irradiation.
- Created high-density optical memory storage in three-dimensional by photoluminescence change in rare-earth doped glasses and photorefractive photopolymers. The change of photo-luminescence was induced by two-photon absorption using femtosecond laser.
- Studied the optical properties of photorefractive crystals (Pr:$LiNbO_3$, Stoichiometric and congruent Tm:$LiNbO_3$,) including light-induced absorption, nonvolatile holographic storage, photoelectric effect, and spectroscopy.

Vietnam National University, Hanoi, Vietnam **2000-2002**

Department of Quantum Optics, Faculty of Physics.

- Conducted a theoretical study of optical bi-stability in distributed feedback (DFB) semiconductor laser (computational simulation).

TEACHING AND MENTORING EXPERIENCE

University of Michigan **2017-**

- Supervising two undergraduate students in the project of THz generation and THz refractive index measurement of organic materials
- Supervising two graduate student in the laser cooling project
- Taught and performed the science demo for middle school students in the outreach at Slauson Middle School, Ann Arbor.

Columbia University **2013-2016**

- Volunteering teacher, weekly taught Math and Science for a class of ~ 20 students, Community Impact at Columbia University, Summer and Fall 2016.
- Taught several full lectures of Quantum Chemistry for undergraduate students on behalf of Prof. Benjamin Bostick at Barnard College, Columbia University, 2016.
- Supervised four Ph.D. students in the projects of the ultrafast carrier/exciton dynamics in lead halide perovskites, growing super-atom solids and IR spectroscopic study of these materials, photo-physics of donor-acceptor molecules, and organic semiconducting devices.
- Supervised an undergraduate student in the MRSEC outreach summer program 2015.

University of Amsterdam **2010-2012**

- Supervised two master's students in studying space separated carrier multiplication in Si quantum dots and hot carrier emission under cryogenic conditions.

Delft University of Technology **2006-2010**

- Supervised two master's students in the projects of carrier multiplication in core/shell quantum dots and ultrafast exciton/charge dynamics in nanostructured materials.
- Served as a teaching assistant in a course on spectroscopy and nanostructured materials.

Chungbuk National University **2002-2005**

- Supervised three undergraduate students in projects of holographic recording in photorefractive materials, three-dimensional data storage in photorefractive polymers, and rare-earth doped glasses by two-photon absorption.
- Served as a teaching assistant in a course on general and experimental physics.
- Taught general sciences for middle school students.

Vietnam National University **1999-2002**

- Tutored middle and high school students in physics and mathematics.

AWARDS

- Dutch Foundation for Fundamental Research on Matter (FOM) grant for the doctoral research study, the Netherlands (2006-2010). ~ EUR 140k for 4 years.
- Ranked #1 with highest scores in the master's courses, Chungbuk National University, South Korea (2002-2004).
- Brain Korea 21 (BK21) scholarship for graduate study (2002-2005).
- Toyota Scholarship for top 5 students in Physics Department, Vietnam National University, Hanoi (2002).
- 1st prize in National Olympic of Physics for University Students (1999).

PROFESSIONAL DEVELOPMENT

- "The Essentials of Teaching and Learning" at Columbia University **10-12/2016**
- "Individual Development Plan (IDP) Program" at Columbia University **2014, 2016**
- "Transitioning to Research Independence" at Columbia University **7-9/2015**
- "Postdoc Fundamentals of Teaching" at Columbia University **4-6/2015**
- "Grant Writing Workshop" at Columbia University and NYC ASCENT **9/2015**
- "Leadership Program" by Cornell University and the NYC ASCENT **4/2015**

PROFESSIONAL ACTIVITIES

- Served as a reviewer for *Nano Letters, Light: Science & Application* (Nature Publisher), *Scientific Report* (Nature Publisher), *Advanced Materials, Nanoscale, The Journal of Physical Chemistry, Journal of Vacuum Science and Technology, CrystEngComm, Materials* (MDPI), *Journal of Science: Advanced Materials and Devices*, and the *Journal of Electronic Materials.*
- Chaired the Solar Energy morning session at the Energy and Materials Research conference (EMR), in June 2012, at Torremolinos, Malaga, Spain.
- Assisted the PI in writing and reviewing NSF and DOE grant proposals.

PATENTS

1. *ORGANIC SEMICONDUCTOR COMPOUNDS AND METHODS OF USE.* C. Nuckolls, Y. Zhong, R. Chen, B. Kumar, **M.T. Trinh**, W. Wang, C. Nam, M.Y. Sfeir, M. L. Steigerwald, X.-Y. Zhu, S. Xiao, F. Ng.
   WO patent: WO2015171640 A1. (2015). Provisional U.S. patent: PCT/US2015/029285
2. *LONG, ATOMICALLY PRECISE DONOR-ACCEPTOR COVE-EDGE NANORIBBONS AS ELECTRON ACCEPTORS IN SOLAR DEVICES AND PHOTODETECTORS*. Colin Nuckolls; Yu Zhong; Boyuan Zhong; Tom Sisto; **M. Tuan Trinh**; Xinjue Zhong; Fay Ng; Michael Steigerwald; Kiyoshi Miyata; Xiaoyang Zhu
   Filing in progress.

PUBLICATIONS

Total citations: 2,200+, h-index = 18, i10-index = 24, seven papers with 100+ citations in Google Scholar, four papers in *Nature* research journals, six in *Nano Letters*, three in *Science Advances*, and eight in *Journal of the American Chemical Society*.

Selected Publications (underlines are the students that I directly mentored)

1. **M.T. Trinh**, A. Pinkard, A. Pun, S. Sanders, M. Sfeir, L. Campos, X. Roy, X.-Y. Zhu.
   Distinct Properties of the Triplet Pair State from Singlet Fission.
   Science Advances (2017, in press).
2. E. O'Brien, **M.T. Trinh**, R. Kann, J. Chen, G. Elbaz, A. Masurkar, T. Atallah, M. Paley, N. Patel, D. Paley, E. Doud, A. Crowther, I. Kymissis, A. Millis, D. Reichman X-Y. Zhu, X. Roy.
   Single-crystal to singlet-crystal intercalation of a low-bandgap superatomic crystal
   Nature Chemistry (2017, in press). (Impact Factor = 27.893).
3. K. Miyata, D. Meggiolaro, **M.T. Trinh**, P. Joshi, E. Mosconi, S. Jones, F. De Angelis, X-Y. Zhu.
   Large Polarons in Lead Halide Perovskites.
   Science Advances (2017, in press).
4. H. Zhu[+], **M.T. Trinh**[+], J. Wang, Y. Fu, P. Joshi, K. Miyata, S. Jin, X.-Y. Zhu.
   ([+] contributed equally). Organic Cations are Not Essential to the Remarkable Properties of Band Edge Carriers in Lead Halide Perovskites.
   Advanced Materials, 29, 1603072 (2017).(Impact Factor = 18.960).
5. B. Zhang, **M.T. Trinh**, B. Fowler, M. Ball, Q. Xu, F. Ng, M. Steigerwald, X.-Y. Zhu, C. Nuckolls, Y. Zhong.
   Rigid, Conjugated Macrocycles for High Performance Organic Photodetectors
   Journal of the American Chemical Society, 138, 16426 (2016). (Impact Factor = 13.038).
6. L. Zhu, **M.T. Trinh**, L. Yin, Z. Zhang.
   Sequential Oligodiacetylene Formation for Progressive Luminescent Color Conversion via Co-Micellar Strategy
   Chemical Science, 7, 2058 (2016). (Impact Factor = 9.144).
7. **M.T. Trinh**, X. Wu, D. Niesner, X.-Y. Zhu
   Many-Body Interactions in Photo-Excited Lead Iodide Perovskite
   Journal of Materials Chemistry A, 3, 9285 (2015). (Impact Factor = 8.262).
8. Haiming Zhu, Yongping Fu, Fei Meng, Xiaoxi Wu, Zizhou Gong, Qi Ding, Martin Gustafsson, **M.T. Trinh**, Song Jin, X.-Y. Zhu.
   Lead Halide Perovskite Nanowire Lasers with Low Lasing Thresholds and High Quality factors
   Nature Materials, 14, 636 (2015). (Impact Factor = 38.891).
9. Y. Zhong, **M.T. Trinh**, R. Chen, G. Purdum, P. Khlyabich, M. Sezen, S. Oh, H. Zhu, B. Fowler, B. Zhang, W. Wang, C. Nam, M. Sfeir, C. Black, M. Steigerwald, Y. Loo, F. Ng, X-Y. Zhu, C. Nuckolls.
   Molecular Helices as Electron Acceptors in High-Performance Bulk Heterojunction Solar Cells
   Nature Communication, 6, 8242 (2015). (Impact Factor = 11.329).
10. Q. Chen, **M.T. Trinh**, D. Paley, M. Preefer, H. Zhu, B. Fowler, X.-Y. Zhu, M. Steigerwald, C. Nuckolls.
    Strain-Induced Stereoselective Formation of Blue-Emitting Cyclostilbenes
    Journal of the American Chemical Society, 127, 12282 (2015). (Impact Factor = 13.038).
11. **M.T. Trinh,** Y. Zhong, Q. Chen, T. Schiros, S. Jockusch, M. Sfeir, M. Steigerwald, C. Nuckolls, and X.-Y. Zhu.
    Intra- to Intermolecular Singlet Fission
    Journal of Physical Chemistry C, 119, 1312 (2015). (Impact Factor = 4.509).
12. X. Wu[+], **M.T. Trinh**[+], D. Niesner[+], H. Zhu[+], Z. Norman, J. Owen, O. Yaffe, X.-Y. Zhu

(+ contributed equally). Trap States in Lead Iodide Perovskites.
Journal of the American Chemical Society, 137, 2089 (2015). (Impact Factor = 13.038).

13. X. Wu, **M.T. Trinh**, X.-Y. Zhu.
Excitonic Many-Body Interactions in Two-Dimensional Lead Iodide Perovskite Quantum Wells
Journal of Physical Chemistry C, 119, 14714 (2015). (Impact Factor = 4.509).

14. Y. Zhong, **M.T. Trinh**, R. Chen, W. Wang, P. Khlyabich, B. Kumar, Q. Xu, C. Nam, M. Sfeir, C. Black, M. Steigerwald, Y. Loo, S. Xiao, Fay Ng, X.-Y. Zhu, C. Nuckolls.
Efficient Organic Solar Cells with Helical Perylene Diimide Electron Acceptors.
Journal of the American Chemical Society, 136, 15215 (2014). (Impact Factor = 13.038).

15. **M.T. Trinh**, M. Sfeir, J. Choi, J. Owen, and X-Y. Zhu.
A hot electron-hole pair breaks the symmetry of a semiconductor quantum dot.
Nano Letters, 13, 6091 (2013). (Impact Factor = 13.779).

16. **M.T. Trinh***, R. Limpens, T. Gregorkiewicz. (* corresponding author).
Experimental and modeling study of Auger recombination in silicon nanocrystals.
Journal of Physical Chemistry C, 117, 5963 (2013). (Impact Factor = 4.509).

17. **M.T. Trinh***, R. Limpens, W. de Boer, J. Schins, L. Siebbeles, T. Gregorkiewicz*.
(* corresponding author).
Direct generation of multiple excitons in adjacent Si nanocrystals revealed by ultrafast induced absorption.
Nature Photonics, 6, 316 (2012). (Impact Factor = 31.167).
Highlighted in the News and Views: A. J. Nozik, Photovoltaics: Separating multiple excitons, *Nature Photonics* 6, 272 (2012).

18. W. de Boer, **M.T. Trinh**, D. Timmerman, J. Schins, L. Siebbeles, T. Gregorkiewicz.
Increased carrier generation rate in Si nanocrystals in SiO_2 investigated by induced absorption.
*Applied Physics Letters***,** 99, 053126 (2011). (Impact Factor = 3.142).

19. Y. Gao, E. Talgorn, M. Aerts, **M.T. Trinh**, J. Schins, A. Houtepen, L. Siebbeles
Enhanced hot-carrier cooling and ultrafast spectral diffusion in strongly-coupled PbSe quantum-dot solids.
*Nano Letters***,** 11, 5471 (2011). (Impact Factor = 13.779).

20. **M.T. Trinh**, L. Polak, J. Schins, A. Houtepen, R. Vaxenburg, G. Maikov, G. Grinbom, A. Midgett, J. Luther, M. Beard, A. Nozik, M. Bonn, E. Lifshitz, L. Siebbeles.
Anomalous independence of multiple exciton generation on different group IV-VI quantum dot architectures.
*Nano Letters***,** 11, 1623 (2011). (Impact Factor = 13.779).

21. J. Schins, **M.T. Trinh**, A. Houtepen, L. Siebbeles.
Probing formally forbidden optical transitions in PbSe nanocrystals by time- and energy-resolved transient absorption spectroscopy.
Physical Review B, 80, 035323 (2009). (Impact Factor = 3.718).

22. **M.T. Trinh**, A. Houtepen, J. Schins, J. Piris, L. Siebbeles.
Nature of the second optical transition in PbSe nanocrystals.
Nano Letters, 8, 2112, (2008). (Impact Factor = 13.779).

23. **M.T. Trinh**, A. Houtepen, J. Schins, T. Hanrath, J. Piris, W. Knulst, A. Goossens, L. Siebbeles.
In spite of recent doubts carrier multiplication does occur in PbSe nanocrystals.
Nano Letters, 8, 1713 (2008). (Impact Factor = 13.779).
(Top 10 most cited paper by Nano Letters, as of 2011).

Other Publications

24. X. Wu, L. Tan, K. T. Hu, X, Shen, K. Miyata, **M.T. Trinh**, S. Liu, D. Egger, R. Li, R. Coffee, S. Liu, D. Egger I. Makasyuk, Q. Zheng, A. Fry, J. Robinson, X. Wang, L. Kronik, X.-Y. Zhu, A. Rappe, A. Lindenberg.
    Light-induced picosecond rotational disordering in hybrid organic-inorganic perovskites.
    Science Advances (2017, in press).

25. T. Sisto, Y. Zhong, B. Zhang, **M.T. Trinh**, K. Miyata, X. Zhong, X.-Y. Zhu, M. Steigerwald, F. Ng, C. Nuckolls.
    Long, Atomically Precis Donor-Acceptor Cove-Edge Nanoribbons as Electron Acceptors.
    Journal of the American Chemical Society, Comm. 139, 5648 (2017).

26. M Truong, **M.T. Trinh**, H. Dang, V. Nguyen.
    Numerical investigation of polarization insensitive two-mode division (De)multiplexer based on an asymmetric directional coupler.
    Photonics and Nanostructures, invited paper, 23, 50 (2017).

27. D. Niesner, H. Zhu, K. Miyata, P. Joshi, T. Evans, B. Kudisch, **M.T. Trinh**, M. Marks, X. Zhu.
    Persistent Energetic Electrons in Methylammonium Lead Iodide Perovskite Thin Films.
    Journal of the American Chemical Society 138, 15717 (2016).

28. T. Hu, M. Smith, E. Dohner, M. Sher, X. Wu, **M.T. Trinh**, A. Fisher, J. Corbett, X-Y. Zhu, H. Karunadasa, and A. Lindenberg.
    Mechanism for Broadband White-Light Emission from Two-Dimensional (110) Hybrid Perovskites.
    *Journal of Physical Chemistry Letters***,** 7, 2258 (2016).

29. B. Choi, J. Yu, D. Paley, **M.T. Trinh**, M. Paley, J. Karch, A. Crowther, C. Lee, R. Lalancette, X-Y. Zhu, P. Kim, M. Steigerwald, C. Nuckolls, X. Roy.
    Van der Waals Solids from Self-Assembled Nanoscale Building Blocks.
    *Nano Letters***,** 16, 1445 (2016).

30. S. Sanders, E. Kumarasamy, A. Pun, **M.T. Trinh**, B. Choi, J. Xia, E. Taffet, J. Low, J. Miller, X. Roy, X-Y. Zhu, M. Steigerwald, M. Sfeir, L. Campos.
    Quantitative Intramolecular Singlet Fission in Bipentacenes.
    Journal of the American Chemical Society, 137, 8965 (2015).

31. Y. Zhong, B. Kumar, S. Oh, **M.T. Trinh**, Y. Wu, K. Elbert, P. Li, X. Zhu, S. Xiao, F. Ng, M. Steigerwald, C. Nuckolls.
    Helical Ribbons for Molecular Electronics.
    Journal of the American Chemical Society, 136, 8122 (2014).

32. V. Svrcek, K. Dohnalova, D. Mariotti, **M.T. Trinh**, R. Limpens, S. Mitra, T. Gregorkiewicz, K. Matsubara, M. Kondo.
    Dramatic enhancement of photoluminescence quantum yields for surface-engineered Si nanocrystals within the solar spectrum.
    *Advanced Functional Materials***,** 23, 6051 (2013).

33. D. Timmerman, **M.T. Trinh**, W. de Boer, K. Dohnalova, T. Gregorkiewicz.
    Manipulating photon energy with Si nanocrystals.
    Optics for Solar Energy (OSE), Optical Society of America, ST4A.3 (2012)

34. N. Ha, S. Cueff, K. Dohnalova, **M.T. Trinh**, C. Labbe, R. Rizk, I. Yassievich, T. Gregorkiewicz.
    Photon cutting for excitation of Er^{3+} ions in SiO_2 sensitized by Si quantum dots.
    Physical Review B, 84, 241308(R) (2011).

35. J. Piris, T. Dykstra, A. Bakulin, P. Loosdrecht, W. Knulst, **M.T. Trinh**, J. Schins, L. Siebbeles.
    Photogeneration and ultrafast dynamics of excitons and charges in P3HT/PCBM blends.
    Journal of Physical Chemistry C, 113, 14500 (2009).

36. S. Lee, K. Jang. J. Shin, **M.T. Trinh**, K. Lim, I. Sohn, Y. Noh, J. Lee, E. Kim.
    Spectral change in silver-doped sodium-borate glass by using femtosecond laser irradiation.

Journal of the Korean Physical Society, 52, 1665-1668 (2008).

37. **M.T. Trinh**, S. Lee, K. Lim, E. Kim.
Optical memory in DuPont photopolymers by using femtosecond laser pulses.
Journal of the Korean Physical Society, 50, 474-478 (2007).

38. S. Lee, **M.T. Trinh**, J. Nam, K. Lim, M. Lee.
Laser-induced defect centers and valence state change of Mn ions in sodium borate glasses.
Journal of Luminescence, 122, 142-145 (2007).

39. K. Lim, S Lee, **M.T. Trinh**, S. Kim, D. Hamilton, G. Gibson.
Femtosecond laser-induced reduction in Eu-doped sodium borate glasses.
Journal of Luminescence, 122, 14-16 (2007).

40. **M.T. Trinh**, K. Lim, S. Lee, J. Nam, E. Kim.
Three-dimensional memory using photoreduction of Eu ions.
*Proc. SPIE***,** 6327, 632714-632721 (2006).

41. V. Pham, S. Lee, **M.T. Trinh**, K. Lim, D. Hamilton.
Light-induced absorption and holographic recording in Pr : LiNbO3.
*Journal of the Korean Physical Society***,** 49, 533-537 (2006).

42. V. Pham, S. Lee, **M.T. Trinh**, K. Lim, D. Hamilton, K. Polgár.
Nonvolatile two-color holographic recording in Tm-doped near-stoichiometric $LiNbO_3$.
*Optics Communications***,** 248, 89-96 (2005).

43. K. Lim, V. Pham, S. Lee, **M.T. Trinh**, D. Hamilton, K. Polgar.
Characteristics of two-color holographic recording in Lithium Niobate doped with Thulium.
*Proc. SPIE***,** 5560, 1-8 (2004).

44. K. Lim, V. Pham, S. Lee, **M.T. Trinh**, L. Hesselink, R. Neugaonkar.
Photorefractive and spectroscopic properties of Pr: LiNbO3.
Proc. SPIE, 5206, 45-54 (2003).

Manuscripts under Review and in Preparation

45. E. de Jong, H. Rutjes, J. Valenta, **M.T. Trinh**, A. Poddubny, A. Gert, I. Yassievich, T. Gregorkiewicz. Thermally stimulated exciton emission in Si nanocrystals.
Nature Communication (under review).

46. **M. T. Trinh**, M. Ball, B. Fowler, M. Sfeir, M. L. Steigerwald, C. Nuckolls, X.-Y. Zhu.
Direct Observation of Coherent Vibration in a Covalent Donor-Acceptor Molecule.

47. **M. T. Trinh**, G. Li, X. Zhong, M. Sfeir, L. Li, M. L. Steigerwald, G. Dong, X.-Y. Zhu.
Many-body Interaction in 0- and 1-dimensional Graphene.

TALKS

1. Triplet Separation from Triplet Pairs in Intramolecular Singlet Fission (invited).
Singlet Fission Workshop, April 23, 2016, New York University, New York.

2. Multiple Exciton Generation in Inorganics Nanocrystal and Organic Molecules (invited).
PChem Seminar, March 1, 2016, Columbia University, New York.

3. Free Charge Carriers in Lead Iodide Perovskites Revealed by Transient Absorption Spectroscopy.
American Physical Society (APS) March Meeting, March 2-6, 2015, San Antonio, TX.

4. Intra-to Inter-Molecular Singlet Fission in Oligoenes. (invited).
Energy Materials Nanotechnology (EMN) Fall Meeting, Nov. 22-25, 2014, Orlando, FL.

5. Intra-to Inter-Molecular Singlet Fission in Diphenyl Dicyano Oligoene. (invited).
Energy Frontier Research Center (EFRC), April 11, 2014, Columbia University, NY.

6. Breaking the symmetry of a PbSe quantum dot by a hot electron-hole pair.
   American Physical Society (APS) March Meeting, March 3-7, 2014, Denver, CO.
7. Spatially separated carrier multiplication in silicon Nanocrystals: towards high efficiency solar cells. *The Energy and Materials Research conference (EMR), June 20-22, 2012, Torremolinos, Malaga, Spain. (Chair of the Solar Energy, morning session).*
8. Direct generation of multiple excitons in adjacent Si nanocrystals upon absorption of a single photon revealed by ultrafast induced absorption. *European Materials Research Society (E-MRS) Spring Meeting, May 14-18, 2012, Strasbourg, France.*
9. Role of hot carriers in carrier multiplication for Si nanocrystals embedded in SiO_2.
   European Materials Research Society (E-MRS) Fall Meeting, Sep 19-23, 2011, Warsaw, Poland.
10. Investigation of microscopic mechanism of space separated quantum cutting in Si nanocrystals embedded in SiO_2-matrix.
    Materials Research Society (MRS) conference, April 25-29, 2011, San Francisco, CA.
11. Carrier multiplication in PbSe nanocrystals: towards high efficiency solar cells (invited).
    Department of Chemical Engineering colloquium, October 18, 2010, Delft University of Technology, Delft, the Netherlands.
12. Effects of an inorganic shell on Carrier Multiplication in PbSe quantum dots
    Joint Solar Programme annual meeting (Foundation for Fundamental Research on Mater: FOM), Jan 12, 2010, University of Amsterdam, Amsterdam, the Netherlands.
13. Ultrafast spectroscopy of optical transitions in PbSe nanocrystals.
    NWO- Theory and Spectroscopy meeting, Feb 15-16, 2010, Veldhoven, the Netherlands.
14. Uncovering the "forbidden" SP transition in PbSe nanocrystals.
    Joint Solar Programme annual meeting (Foundation for Fundamental Research on Mater: FOM), Jan 9, 2009, Delft University of Technology, Delft, the Netherlands.
15. Generation of multiple excitons by a single photon: towards high efficiency solar cells.
    NWO-Theory and Spectroscopy meeting, Jan 26-27, 2009, Lunteren, the Netherlands.
16. Multi-Exciton Generation in PbSe Nanocrystals.
    Joint Solar Programme annual meeting (Foundation for Fundamental Research on Mater: FOM), Dec 20, 2007. University of Groningen, the Netherlands.
17. Multi-exciton generation and dissociation in PbSe/P3HT blend for high-efficiency solar cells.
    Joint Solar Programme annual meeting (Foundation for Fundamental Research on Mater: FOM), Jan 11, 2007. Utrecht University, the Netherlands.

TECHNICAL SKILLS

- Construction of complicated optical setups from scratch and designing experiments. Repair and maintenance of ultrafast laser systems.
- Ultrafast spectroscopies: transient absorption, time-resolved second harmonic generation, optical pump-THz probe.
- Standard spectroscopies, time-resolved photoluminescence, relative and absolute photoluminescence quantum yield measurements, Fourier Transform infrared spectroscopy (FT-IR), Raman spectroscopy, confocal microscope, experiments in cryogenic temperature (liquid nitrogen and helium).
- Data analysis and simulations with programs: Igor, Origin, Matlab, Mathematica, and LabView.
- Sample preparation: Organic and perovskite thin films by molecular thermal evaporation under high vacuum, grew single perovskite crystals, grew Si nanocrystal by radio-frequency co-sputtering and post high temperature annealing, synthesis PbSe/PbS nanocrystals by hot chemical injection method, grew rare-earth doped glasses, grew co-crystals using nanoclusters

(super-atoms). Sample characterization using AFM and XRD. Ultrahigh vacuum experience. Clean room experience.

- Organic solar cell and photo detector fabrications and characterizations.

REFERENCES

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