

## LOUISE E. SINKS

LinkedIn: <https://www.linkedin.com/in/louise-sinks/>

GitHub: <https://github.com/lisinks>

### TECHNICAL SKILLS

R Programming, MATLAB, VBA, Python, SQL, Excel/ Google Sheets, Stat-Ease, Tableau, Data Presentation, Data Cleaning, Exploratory Data Analysis (EDA), Data Visualization, Project Management, Web Scraping (rvest), Mapping (leaflet), Statistical Analysis, Statistical Process Control, Design of Experiments, Fitting, Modeling/ Machine Learning, Simulations

### EMPLOYMENT

**Freelance Technical Consultant** (part-time) 2017-present

- Prepares technical responses to US and foreign Patent Office inquiries and works with the patent lawyer to get claims approved
- Advises on the technical and business merit of patent claims and drafts patent claims to improve the strategic value of the patent

#### US Nano LLC

**Vice President** 2012-2017

**Senior Scientist** 2011-2012

#### Project Management

- Wrote and managed grants to fund research, leading to ~\$924,000 of NSF SBIR grants (non-dilutive funding)
- Directed US Nano's research activities to develop semiconductor nanowire technologies and managed a team of 5-10 technical and support staff, resulting in two US patents for scalable synthesis of nanowires and the reduction of the materials cost by 140-fold

#### Technical & Analytical Work

- Introduced applied statistical methods such as DOE (Design of Experiments), leading to such improvements as 3-fold faster development of new materials and a one million-fold improvement in printed photosensor performance
- Implemented Statistical Process Control on manufacturing activities, which allowed detection of issues earlier in the workflow, saving ~30 person-hours and thousands of dollars in materials cost per prevented mis-run
- Wrote custom Excel VBA macros to reduce analysis and reporting time for specific experiments from hours to under five minutes
- Designed Excel dashboards with pivot tables and graphs, allowing the scientific team to data mine all experiments performed by the company, often leading to insights beyond the planned experimental results

- Formulated Nanowire inks using experimental designs based on fractional factor designs and Hansen solubility parameters to create ink-jet inks that were higher performing than commercially available carbon nanotube analogs.
- Built a photo/electrical test station, performed device testing, and wrote Matlab code to automatically analyze the data, streamlining the process and reducing analysis errors

#### Marketing & Business Development efforts

- Generated copy and visualizations for white papers, company website, and other promotional materials
- Developed and presented pitches to Angels, VCs, and potential industrial partners
- Interviewed ~50 potential customers through the Michigan I-Corps program to understand needs around nanowire technology

#### **Prof. Sergei A. Vinogradov**

#### **University of Pennsylvania**

Postdoctoral Research Fellow

2008-2011

- Developed a new two-photon lifetime imaging microscopy technique for quantifying oxygen content in cells and produced the first 3D phosphorescence lifetime and intensity images
- Wrote Matlab code to simulate the microscope's point spread function to understand the relationship between resolution and signal-to-noise ratio
- Validated and characterized new fluorescent or phosphorescent oxygen, zinc, and pH sensing probes
- Wrote Matlab code to fit data and extract photophysical parameters such as excited state lifetimes, two-photon absorption cross-sections, Stern-Volmer constants, and quantum yields of emission
- Performed cell culture work to maintain cells (HeLa, macrophages, fibroblasts) used in microscopy
- Collaborated with multiple research groups to explore methods of loading probe molecules into cells, such as microporation, transfection agents, scrape loading, and endocytosis of vesicles
- Performed various assays to determine the viability of cells after loading with the probe molecules and under experimental conditions such as irradiation with light

#### **Center for Oxygen Microscopic Imaging University of Aarhus**

July-August 2009

Visiting Researcher

- Tested cytotoxic effects of fluorescent probes developed in Vinogradov lab
- Performed singlet oxygen microscopy to study reactive oxygen species
- Learned and performed patch-clamp technique (whole-cell electrophysiological measurements) to study the effect of localized reactive oxygen species generation on ion channel function in mouse neurons

**Prof. R. Hochstrasser & Prof. M. J. Therien****University of Pennsylvania**

NIH National Research Service Award Postdoctoral Fellow

2005-2008

Postdoctoral Research Fellow

2004-2005

- Maintained and improved femtosecond spectrometer, including redesigning modules to reduce temporal chirp 6-fold and building a VIS pump/ IR-probe module
- Utilized IR-pump/ probe, VIS-pump/probe, 2DIR, and VIS-pump/ IR-probe ultra-fast techniques to study the influence of the environment on biologically relevant processes such as proton-coupled electron transfer.
- Assisted in grant writing for group funding and presented research overviews to external review committees during audits and evaluations.
- Modeled various photophysical processes using OriginPro and Matlab

**Ford Motor Company**

Summers 1998, 1999

Professional/Technical Trainee (Intern)

- Contributed to developing a more sensitive and durable pressure-sensitive paint (PSP) for aerodynamic applications, resulting in two Ford confidential papers and an invention disclosure.
- Researched appropriate polymer bases, identified chromophores with high sensing potential, and designed and implemented standards to evaluate PSPs.
- Assisted in constructing and automating an emission spectrometer that could apply various gas mixtures to the sample.
- Helped implement Pressure Sensitive Paint measurement technique in a Ford wind tunnel and demonstrated the system to United States Air Force and Boeing collaborators.

**EDUCATION****Northwestern University****Evanston, IL**

Thesis Advisor: Prof. M. R. Wasielewski

PhD in Chemistry, Dissertation Title: Role of Environment on Photo-induced Electron Transfer

MS in Chemistry, Thesis Title: Photo-induced Electron Transfer of Donor-Acceptor Molecules in a Liquid Crystalline Environment

Researched solvent/media effects on photo-induced electron transfer in organic covalent donor-acceptor systems as well as the role of conformational gating on electronic coupling of donors and acceptors. Studied impact on  $\pi$ - $\pi$  driven self-assembly on electron and energy transfer within the nanostructure. Designed, constructed, and maintained two femtosecond transient absorption laser systems. Synthesized donor-acceptor molecules.

**University of Virginia****Charlottesville, VA**

- Intermediate Honors
- Echols Scholar (College of Arts and Sciences honors program)
- Major: BS in Chemistry with Honors, BA in Physics Minor: Math

## **GRANTS AND AWARDS**

- NSF SBIR Phase II: Innovations in Nanowire Manufacturing: Large Scale Synthesis of Inorganic Semiconducting Nanowires and Application to Printed Photosensors (April 2014- June 2016)
- NSF SBIR Phase IB: Supplemental Funding to “Innovations in Nanowire Manufacturing: Large Scale Synthesis of Inorganic Semiconducting Nanowires and Application to Printed Electronics.” (January 2013- June 2013)
- NSF SBIR Phase I: Innovations in Nanowire Manufacturing: Large Scale Synthesis of Inorganic Semiconducting Nanowires and Application to Printed Electronics. (June 2012- December 2012)
- NIH National Research Service Award Postdoctoral Fellowship (January 2005- June 2007)

## **PATENTS**

- Synthesis of CdSe/ZnS Core/Shell Semiconductor Nanowires, US Patent 9,627,299. Issued Apr 18, 2017
- Apparatus and Methods for Continuous Flow Synthesis of Semiconductor Nanowires, US 9,306,110. Issued Apr 5, 2016

## **CERTIFICATIONS**

DataCamp Data Scientist Professional Certificate, Google Data Analytics Certificate

## **PORTFOLIO**

Peer reviewed papers: [Google Scholar](#)

Tableau: <https://public.tableau.com/app/profile/louise.sinks>

Website: <https://lsinks.github.io/>

## **PRESS**

Florida High Tech Corridor 2016 Faces of Technology.

Print article, p. 38: <http://usnanollc.com/wp-content/uploads/2016/04/FHT-2016-compressed.pdf>

Video Interview:

<https://www.youtube.com/watch?v=ypLwoX6FvZs>

Biz(941)'s 2015 Person to Watch List

<https://www.941ceo.com/articles/2015/10/30/people-to-watch-2015>

Assembling functional nanowire yarns with light, Nanowerk Blog

<http://www.nanowerk.com/spotlight/spotid=27026.php>

## **SELECTED TALKS**

“Visible Pump/ IR Probe Technique”, 1st Annual Ultrafast Spectroscopy Workshop Sarasota, FL January 2010

“Oxygen Microscopy with Two-Photon-Enhanced Phosphorescent Nanoprobes”, Optical Society of America Spring Congress: Novel Techniques in Microscopy Vancouver, Canada April 2009

“Oxygen microscopy with two-photon enhanced phosphorescence nanoprobes”, Chemical Biophysics Mini-Symposium Series: Lasers in Chemistry, Biochemistry, and Medicine Philadelphia, PA March 2009

“Photophysics of porphyrins in solution and in films”, International Conference on Porphyrins and Phthalocyanines Rome, Italy July 2006

"Photophysics of Self-Assembled Multichromophoric Arrays", Argonne National Laboratory Center for Nanoscale Materials Seminar Series Argonne, IL July 2005

## **POSTER PRESENTATIONS**

Howard Hughes Medical Institute Janelia Research Campus's Symposium on Multiphoton Imaging: The Next  $6 \times 10^{23}$  Femtoseconds, 2011

Electron Donor-Acceptor Interactions Gordon Conference in Newport, RI 2004

30th Reaction Mechanisms Conference in Evanston, IL 2004

15th Inter-American Photochemical Society Winter Conference in Tempe, AZ 2004

The 7th Northwestern University Industrial Associates Conference in Evanston, IL 2003

Electron Donor-Acceptor Interactions Gordon Conference in Newport, RI 2002

Chicago Section of the Society of Applied Spectroscopy in Evanston, IL 2001

## **PUBLICATIONS**

(Collectively have more than 3200 citations, and 10 papers have over 100 citations)

32. Park, J.; Park, T.-H.; Sinks, L. E.; Deria, P.; Park, J.; Baik, M.-H.; Therien, M. J. Unusual Solvent Polarity Dependent Excitation Relaxation Dynamics of a Bis [p-Ethynyldithiobenzoato] Pd-Linked Bis [(Porphinato) Zinc] Complex. *Molecular Systems Design & Engineering* **2018**, 3 (1), 275–284.

31. Devor, A., Sakadžić, S; Yaseen, M. A.; Roussakis, E.; Tian, P.; Slovin, H.; Vanzetta, I.; Teng,

I.; Saisan, P. A.; Sinks, L. E.; Dale, A. M.; Vinogradov, S.V.; Boas, D.A. Functional imaging of cerebral oxygenation with intrinsic optical contrast and phosphorescent probes, *Optical Imaging of Neocortical Dynamics* **2014**

30. Fry, H. C.; Lehmann, A.; Sinks, L. E.; Asselberghs, I.; Tronin, A.; Krishnan, V.; Blasie, J. K.; Clays, K.; DeGrado, W. F.; Saven, J. G.; Therien, M. J. Computational de novo design and characterization of a protein that selectively binds a highly hyperpolarizable abiological chromophore. *J. Am. Chem. Soc.* **2013**, 135, 13914–26.

29. Petchsang, N.; McDonald, M. P.; Sinks, L. E.; Kuno, M. Light induced nanowire assembly: the electrostatic alignment of semiconductor nanowires into functional macroscopic yarns. *Advanced materials (Deerfield Beach, Fla.)* **2013**, 25, 601–5.

28. Pedersen, B. W.; Sinks, L. E.; Breitenbach, T.; Schack, N. B.; Vinogradov, S. A.; Ogilby, P. R. Single cell responses to spatially controlled photosensitized production of extracellular singlet oxygen. *Photochemistry and Photobiology* **2011**, 87, 1077–1091.

27. Sinks, L. E.; Roussakis, E.; Sakadžić, S.; Robbins, G. P.; Hammer, D. A.; Devor, A.; Boas, D. A.; Vinogradov, S. A. Two-photon phosphorescence lifetime microscopy (2PLM) for high resolution imaging of oxygen. In *Proceedings of SPIE* **2011**, Vol. 7903, p. 79032A–79032A–8.

26. Ishizuka, T.; Sinks, L. E.; Song, K.; Hung, S.-T.; Nayak, A.; Clays, K.; Therien, M. J. The roles of molecular structure and effective optical symmetry in evolving dipolar chromophoric building blocks to potent octopolar nonlinear optical chromophores. *J. Am. Chem. Soc.* **2010**, 133, 2884–2896.

25. Sinks, L. E.; Roussakis, E.; Esipova, T. V.; Vinogradov, S. A. Phosphorescent Dendritic Nanoprobes for Biological Imaging of Oxygen. *Abstracts of Papers of the American Chemical*, **2010**, Vol. 239.

24. Deria, Pravas; Sinks, Louise; Park, Tae-Hong; Tomezsko, Diana; Brukman, Matthew; Bonnell, Dawn; Therien, Michael, Phase Transfer Catalysts Drive Diverse Organic Solvent Solubility of Single-Walled Carbon Nanotubes Helically Wrapped by Ionic, Semi-Conducting Polymers. *Nano Letters*, **2010**, 10(10), 4192-4199.

23. Sinks, L. E.; Robbins, G. P.; Roussakis, E.; Troxler, T.; Hammer, D. A.; Vinogradov, S. A., Two-Photon Microscopy of Oxygen: Polymersomes as Probe Carrier Vehicles. *J. Phys. Chem. B*, **2010**, 114(45), 14373-14382.

22. Sinks, L. E.; Roussakis, E.; Esipova Tatiana, V.; Vinogradov Sergei, A., Synthesis and calibration of phosphorescent nanoprobes for oxygen imaging in biological systems. *Journal of visualized experiments : JoVE* **2010**, (37).

21. Sinks, L. E.; Finikova, O. S.; Vinogradov, S. A. Oxygen Microscopy with Two-Photon-Enhanced Phosphorescent Nanoprobes. *Novel Techniques in Microscopy*; Optical Society of America, **2009**.

20. Giaimo, J. M.; Lockard, J. V.; Sinks, L. E.; Scott, A. M.; Wilson, T. M.; Wasielewski, M. R.,

Excited Singlet States of Covalently Bound, Cofacial Dimers and Trimers of Perylene-3,4:9,10-bis(dicarboximide)s. *J. Phys. Chem. A* **2008**, 112 (11), 2322-30.

19. Kelley, R. F.; Shin, W. S.; Rybtchinski, B.; Sinks, L. E.; Wasielewski, M. R., Photoinitiated Charge Transport in Supramolecular Assemblies of a 1,7,N,N'-Tetrakis(zinc porphyrin)-perylene-3,4:9,10-bis(dicarboximide). *J. Am. Chem. Soc.* **2007**, 129 (11), 3173-81.

18. Sinks, L. E.; Frail, P. R.; Therien, M. J. Symposium Lectures-Photophysics of Porphyrins in Solution and in Films. *Journal of Porphyrins and Phthalocyanines* **2006**, 10 (4-6), 399-399.

17. Kumar, K.; Sinks, L. E.; Wang, J.; Kim, Y. S.; Hochstrasser, R. M., Coupling between C-D and CO motions using dual-frequency two-dimensional IR photon echo spectroscopy. *Chem. Phys. Lett.* **2006**, 432 (1-3), 122-27.

16. Duncan, T. V.; Susumu, K.; Sinks, L. E.; Therien, M. J., Exceptional Near-Infrared Fluorescence Quantum Yields and Excited-State Absorptivity of Highly Conjugated Porphyrin Arrays. *J. Am. Chem. Soc.* **2006**, 128 (28), 9000-01.

15. Sinks, L. E.; Weiss, E. A.; Giaimo, J. M.; Wasielewski, M. R., Effect of charge delocalization on radical ion pair electronic coupling. *Chem. Phys. Lett.* **2005**, 404 (4-6), 244-49.

14. Sinks, L. E.; Rybtchinski, B.; Iimura, M.; Jones, B. A.; Goshe, A. J.; Zuo, X.; Tiede, D. M.; Li, X.; Wasielewski, M. R., Self-Assembly of Photofunctional Cylindrical Nanostructures Based on Perylene-3,4:9,10-bis(dicarboximide). *Chem. Mater.* **2005**, 17 (25), 6295-303.

13. Sinks, L.; Fuller, M. J.; Liu, W.; Ahrens, M. J.; Wasielewski, M. R., Photoinduced electron transfer in a donor-acceptor dyad oriented by an aligned nematic liquid crystal solvent. *Chem. Phys.* **2005**, 319 (1-3), 226-34.

12. Lewis, F. D.; Sinks, L. E.; Weigel, W.; Sajimon, M. C.; Crompton, E. M., Ultrafast Proton Transfer Dynamics of Hydroxystilbene Photoacids. *J. Phys. Chem. A* **2005**, 109 (11), 2443-51.

11. Goldsmith, R. H.; Sinks, L. E.; Kelley, R. F.; Betzen, L. J.; Liu, W.; Weiss, E. A.; Ratner, M. A.; Wasielewski, M. R., Wire-like charge transport at near constant bridge energy through fluorene oligomers. *Proc. Natl. Acad. Sci. U. S. A.* **2005**, 102 (10), 3540-45.

10. Fuller, M. J.; Sinks, L. E.; Rybtchinski, B.; Giaimo, J. M.; Li, X.; Wasielewski, M. R., Ultrafast Photoinduced Charge Separation Resulting from Self-assembly of a Green Perylene-based Dye into pi-Stacked Arrays. *J. Phys. Chem. A* **2005**, 109 (6), 970-75.

9. Weiss, E. A.; Sinks, L. E.; Lukas, A. S.; Chernick, E. T.; Ratner, M. A.; Wasielewski, M. R., Influence of Energetics and Electronic Coupling on Through-Bond and Through-Space Electron Transfer within U-Shaped Donor-Bridge-Acceptor Arrays. *J. Phys. Chem. B* **2004**, 108 (29), 10309-16.

8. Weiss, E. A.; Ahrens, M. J.; Sinks, L. E.; Ratner, M. A.; Wasielewski, M. R., Solvent Control of Spin-Dependent Charge Recombination Mechanisms within Donor-Conjugated Bridge-Acceptor Molecules. *J. Am. Chem. Soc.* **2004**, 126 (31), 9510-11.

7. Weiss, E. A.; Ahrens, M. J.; Sinks, L. E.; Gusev, A. V.; Ratner, M. A.; Wasielewski, M. R., Making a molecular wire: charge and spin transport through para-phenylene oligomers. *J. Am. Chem. Soc.* **2004**, 126 (17), 5577-84.
6. Rybtchinski, B.; Sinks, L. E.; Wasielewski, M. R., Photoinduced Electron Transfer in Self-Assembled Dimers of 3-Fold Symmetric Donor-Acceptor Molecules Based on Perylene-3,4:9,10-bis(dicarboximide). *J. Phys. Chem. A* **2004**, 108 (37), 7497-505.
5. Rybtchinski, B.; Sinks, L. E.; Wasielewski, M. R., Combining Light-Harvesting and Charge Separation in a Self-Assembled Artificial Photosynthetic System Based on Perylenediimide Chromophores. *J. Am. Chem. Soc.* **2004**, 126 (39), 12268-69.
4. Li, X.; Sinks, L. E.; Rybtchinski, B.; Wasielewski, M. R., Ultrafast Aggregate-to-Aggregate Energy Transfer within Self-assembled Light-Harvesting Columns of Zinc Phthalocyanine Tetrakis(Perylenediimide). *J. Am. Chem. Soc.* **2004**, 126 (35), 10810-11.
3. Ahrens, M. J.; Sinks, L. E.; Rybtchinski, B.; Liu, W.; Jones, B. A.; Giaimo, J. M.; Gusev, A. V.; Goshe, A. J.; Tiede, D. M.; Wasielewski, M. R., Self-Assembly of Supramolecular Light-Harvesting Arrays from Covalent Multi-Chromophore Perylene-3,4:9,10-bis(dicarboximide) Building Blocks. *J. Am. Chem. Soc.* **2004**, 126 (26), 8284-94.
2. Sinks, L. E.; Wasielewski, M. R., Effects of solvent and structural dynamics on electron transfer reactions of 4-Aminonaphthalene-1,8-dicarboximide donor-acceptor molecules in nematic liquid crystals and isotropic solvents. *J. Phys. Chem. A* **2003**, 107 (5), 611-20.
1. Andersson, M.; Sinks, L. E.; Hayes, R. T.; Zhao, Y.; Wasielewski, M. R., Bio-inspired optically controlled ultrafast molecular AND gate. *Angew. Chem., Int. Ed.* **2003**, 42 (27), 3139-43.