

Brian S. Rolczynski

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The University of Chicago
Gordon Center for Integrative Science, E005
929 East 57th St
Chicago, IL 60637

Email: brolczynski@uchicago.edu
Mobile: (312)515-0821
Office: (773)702-6066
Website: rolczynski.com

EDUCATION

The University of Chicago	Chicago, IL	2013 - present
Postdoctoral fellow, Department of Chemistry and The James Franck Institute		
Northwestern University	Evanston, IL	2007 – 2012
Ph.D., Physical Chemistry Dissertation: “Charge-Transfer Oligomers and Polymers for Organic Photovoltaics: Structure, dynamics, and their implications for solar devices”		
University of Washington	Seattle, WA	2002 – 2007
BS, Chemistry and BA, English (with honors)		

RESEARCH EXPERIENCE

The University of Chicago	Chicago, IL	2013 - present
Postdoctoral fellow, Department of Chemistry and The James Franck Institute Advisor: Greg S. Engel		
<ul style="list-style-type: none">• Built an experiment to measure the time-resolved material response to Laguerre-Gaussian light, discovering new excited state response in bulk GaAs. Helped conceive of, design, and obtain funding (\$3 million) for the experiment.• Developed a time-domain vibrational technique based on 2D electronic spectroscopy, and used it to observe interexciton vibrational correlations directly in the Fenna-Matthews-Olson complex.• Developed a method to obtain highly resolved diagonal and cross peaks in 2D electronic spectra, revealing the detailed spectral features in congested spectra.		
Argonne National Laboratory	Lemont, IL	2010 - 2012
Laboratory graduate research fellow, concurrent with Northwestern University		
Northwestern University	Evanston, IL	2007 – 2012
Graduate research assistant Advisor: Lin X. Chen		
<ul style="list-style-type: none">• Studied intramolecular and intermolecular exciton dissociation in alternating copolymers, identifying trends between intramolecular polymer processes and corresponding bulk		

heterojunction device efficiencies.

- Examined aggregate morphologies in neat and bulk heterojunction alternating copolymer films using grazing incidence wide/small angle X-ray scattering, demonstrating correlations between π - π stacking distances and bulk heterojunction device fill factor.
- Studied spontaneous self-assembly behavior in spin-coated photovoltaic oligomer systems depending on monomer length, using grazing incidence wide/small angle X-ray scattering and atomic force microscopy.
- Characterized anisotropic absorption behavior of organic donor-acceptor cocrystals as a function of modular chromophore species.

GRANTS

1. “Transcribing Quantum Information using Quantum Dynamics of Coherent Materials” (PI: Engel)

10/1/2014 - 9/30/2019

Agency: Department of Defense National Security Science and Engineering Faculty Fellowship

Total costs: \$3,000,000 (all to U. Chicago, PI: Engel)

2. “Coherent Energy Transfer in Novel Excitonic Materials for Solar Energy Applications” (PI: Engel)

1/31/2016 - 1/30/2019

Agency: Qatar National Research Foundation

Total costs: \$3,000,000 (20% to U. Chicago, PI: Engel; 80% to QEERI, PI: Sabre Kais)

TALKS & PUBLICATIONS

— Talks —

8. **Rolczynski, B. S.**; Navotnaya, P.; Engel, G. S. “Driving delocalized dynamics using the orbital angular momentum of light.” ACS Meeting, San Francisco, CA, 3/5/17.

7. **Rolczynski, B. S.**; Yeh, S.; Navotnaya, P.; Ashraf, K.; Gardiner, A.; Cogdell, R.; Engel, G. S. “Resolving the detailed 2D spectral structure of the Fenna-Matthews-Olson complex.” ACS Meeting, San Francisco, CA. 3/5/17.

6. **Rolczynski, B. S.**; Zheng, H.; Singh, V.; Navotnaya, P.; Caram, J.; Ashraf, K.; Gardiner, A.; Cogdell, R.; Engel, G. S. “Correlated vibrational motion in the Fenna-Matthews-Olson complex.” ACS Meeting, San Francisco, CA. 3/2/17.

5. **Rolczynski, B. S.** and Engel, G. S. “Correlated exciton environments in the Fenna-Matthews-Olson complex.” Photosynthesis conference, Marshall, IN, 11/5/16.

4. **Rolczynski, B. S.** and Engel, G. S. “Transcribing light’s orbital angular momentum to materials.” Spin VI, Chicago, IL, 10/17/16.
3. **Rolczynski, B. S.** and Engel, G. S. “Long-lived coherences through correlated environments.” ACS Meeting, Philadelphia, PA, 8/22/16.
2. **Rolczynski, B. S.** and Engel, G. S. “How Long Does a CdSe Quantum Dot Remember Its Excitation Energy?” Nanotalk Symposium, Chicago, IL, 2/25/14.
1. **Rolczynski, B. S.** and Chen, L. X. “The role of tuning push-pull interactions in small optical gap copolymers.” Gordon Research Seminar, Easton, MA, 7/10/11.

— *Publications* —

23. Flanagan, M. L.; Long, P. D.; Dahlberg, P. D.; **Rolczynski, B. S.**; Massey, S. C.; Engel, G. S. “Mutations to R. sphaeroides Reaction Center Perturb Energy Levels and Vibronic Coupling but Not Observed Energy Transfer Rates.” J. Phys. Chem. A. 2015, 120(9), 1479.
22. Cho, S.; **Rolczynski, B. S.**; Xu, T.; Yu, L.; Chen, L. X. “Solution Phase Exciton Diffusion Dynamics of a Charge-Transfer Copolymer PTB7 and Homopolymer P3HT.” J. Phys. Chem. B. 2015, 119(24), 7447.
21. Blackburn, A. K.; Sue, A. C.-H.; Shveyd, A. K.; Cao, D.; Tayi, A.; Narayanan, A.; **Rolczynski, B. S.**; Sarko, J. M.; Bozdemir, O. A.; Wakabayashi, R.; Lehrman, J. A.; Chen, L. X.; Nassar, M. S.; Stupp, S. I.; Stoddart, J. F. “Lock-arm supramolecular ordering: A molecular construction set for cocrystallizing organic charge transfer complexes.” J. Am. Chem. Soc. 2014, 136, 17224.
20. **Rolczynski, B. S.**; Szarko, J. M.; Son, H. J.; Yu, L.; Chen, L. X. “Effects of Exciton Polarity in Charge Transfer Polymer/PCBM Bulk Heterojunction Films.” J. Phys. Chem. Lett. 2014, 5(11), 1856.
19. Szarko, J. M.; **Rolczynski, B. S.**; Lou, S. J.; Xu, T.; Strzalka, J.; Marks, T. J.; Yu, L.; Chen, L. X. “Photovoltaic Function and Exciton/Charge Transfer Dynamics in a Highly Efficient Semiconducting Copolymer.” Adv. Funct. Mater. 2014, 24(1), 10.
18. Zheng, H.; Caram, J. R.; Dahlberg, P. D.; **Rolczynski, B. S.**; Viswanathan, S.; Dolzhnikov, D. S.;

Khadivi, A.; Talapin, D. V.; Engel, G. S. "Dispersion-free continuum two-dimensional electronic spectrometer." *Applied Optics* 2014, 53(9), 1909.

17. Caram, J. R.; Zheng, H.; Dahlberg, P. D.; **Rolczynski, B. S.**; Griffin, G. B.; Dolzhenkov, D. S.; Talapin, D. V.; Engel, G. S. "Exploring size and state dynamics in CdSe quantum dots using two-dimensional electronic spectroscopy." *J. Chem. Phys.* 2014, 140(8), 084701.

16. Griffin, G. B.; Lundin, P. M.; **Rolczynski, B. S.**; Linkin, A.; McGillicuddy, R. D.; Bao, Z.; Engel, G. S. "Ultrafast energy transfer from rigid, branched side-chains into a conjugated, alternating copolymer." *J. Chem. Phys.* 2014, 140(3), 034903.

15. Caram, J. R.; Zheng, H.; Dahlberg, P. D.; **Rolczynski, B. S.**; Griffin, G. B.; Fidler, A. F.; Dolzhenkov, D. S.; Talapin, D. V.; Engel, G. S. "Persistent Interexcitonic Quantum Coherence in CdSe Quantum Dots." *J. Phys. Chem. Lett.* 2014, 5(1), 196.

14. Singh, V. P.; Fidler, A. F.; **Rolczynski, B. S.**; Engel, G. S. "Independent phasing of rephasing and non-rephasing electronic spectra." *J. Chem. Phys.* 2013, 139(8), 084201.

13. Tayi, A. S.; Shveyd, A. K.; Sue, C.-H.; Szarko, J. M.; **Rolczynski, B. S.**; Sarjeant, A. A.; Stern, C. L.; Cao, D.; Paxton, W. F.; Wu, W.; Dey, S. K.; Fahrenbach, A. C.; Guest, J.; Mohseni, H.; Chen, L. X.; Wang, K. L.; Stoddart, J. F.; Stupp, S. I. "Room Temperature Ferroelectricity in Supramolecular Networks of Charge Transfer Complexes." *Nature* 2012, 488, 485.

12. **Rolczynski, B. S.**; Szarko, J. M.; Son, H. J.; Liang, Y.; Yu, L.; Chen, L. X. "Ultrafast Intramolecular Exciton Splitting Dynamics in Isolated Low-Band-Gap Polymers and Their Implications on Photovoltaic Materials Design." *J. Am. Chem. Soc.* 2012, 134, 9, 4142.

11. Gothard, N. A.; Mara, M. W.; Huang, J.; Szarko, J. M.; **Rolczynski, B. S.**; Lockard, J. V.; Chen, L. X. "Strong Steric Hindrance Effect on Excited State Structural Dynamics of Cu(I) Diimine Complexes." *J. Phys. Chem. A* 2012, 116, 9, 1984.

10. Carsten, B.; Szarko, J. M.; Son, H. J.; Wang, W.; Lu, L.; He, F.; **Rolczynski, B. S.**; Lou, S. J.; Chen, L. X.; Yu, L. "Examining the Effect of the Dipole Moment on Charge Separation in Donor-Acceptor Polymers for Organic Photovoltaic Applications." *J. Am. Chem. Soc.* 2011, 133, 50, 20468.

9. Murray, I. P.; Lou, S. J.; Cote, L. J.; Loser, S.; Kadleck, C. J.; Xu, T.; Szarko, J. M.; **Rolczynski, B. S.**; Johns, J. E.; Huang, J.; Yu, L.; Chen, L. X.; Marks, T. J.; Hersam, M. C. "Graphene Oxide Interlayers for Robust, High-Efficiency Organic Photovoltaics." *Phys. Chem. Lett.* 2011, 2, 3006.

8. Szarko, J. M.; Guo, J.; **Rolczynski, B. S.**; Chen, L. X. “Nanoscale structure, dynamics and power conversion efficiency correlations in small molecule and oligomer-based photovoltaic devices.” Nano Rev. 2011, 2, 7249.
7. Szarko, J. M.; Guo, J.; **Rolczynski, B. S.**; Chen, L. X. “Current trends in the optimization of low band gap polymers in bulk heterojunction photovoltaic devices.” J. Mater. Chem. 2011, 21, 22, 7849.
6. **Rolczynski, B. S.**; Szarko, J. M.; Lee, B.; Strzalka, J.; Guo, J.; Liang, Y.; Yu, L.; Chen, L. X. “Length-dependent self-assembly of oligothiophene derivatives in thin films.” J. Mater. Res. 2011, 26, 296.
5. Szarko, J. M.; **Rolczynski, B. S.**; Guo, J.; Liang, Y.; He, F.; Mara, M. W.; Yu, L.; Chen, L. X. “Electronic Processes in Conjugated Diblock Oligomers Mimicking Low Band-Gap Polymers: Experimental and Theoretical Spectral Analysis.” J. Phys. Chem. B 2010, 114, 14505.
4. Szarko, J. M.; Guo, J.; Liang, Y.; Lee, B.; **Rolczynski, B. S.**; Strzalka, J.; Xu, T.; Loser, S.; Marks, T. J.; Yu, L.; Chen, L. X. “When Function Follows Form: Effects of Donor Copolymer Side Chains on Film Morphology and BHJ Solar Cell Performance.” Adv. Mater. 2010, 22, 48, 5468.
3. Guo, J.; Liang, Y.; Szarko, J.; Lee, B.; Son, H. J.; **Rolczynski, B. S.**; Yu, L.; Chen, L. X. “Structure, Dynamics, and Power Conversion Efficiency Correlations in a New Low Bandgap Polymer:PCBM Solar Cell.” J. Phys. Chem. B 2010, 114, 2, 742.
2. Szarko, J.; Guo, J.; Liang, Y.; **Rolczynski, B.**; Yu, L.; Chen, L. X. “The electron and energy transfer between oligothiophenes and thieno[3,4-b]thiophene units.” Proc. of SPIE 2008, 7034, 703403.

— *Commentaries* —

1. **Rolczynski, B. S.**; Navotnaya, P.; Sussman, H. R.; Engel, G. S. “Cysteine-mediated mechanism disrupts energy transfer to prevent photooxidation.” Proc. Nat. Acad. Sci. 2016. 113(31), 8562.

TEACHING

Northwestern University

Evanston, IL

TA, Advanced Undergraduate Laboratory
 Super TA, General Physical Chemistry
 TA, General Inorganic Chemistry
 TA, General Chemistry

Summer 2009
 Spring 2008, Spring 2009
 Winter 2008
 Fall 2007

Kannagara Jinja

Granite Falls, WA

Martial arts (Aikido) instructor, children's class

2002-2007