

Niall Mangan

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Professional Preparation	BS, May 2008 PhD, Nov. 2013	Physics and Math, Minor Chemistry Systems Biology	<i>Clarkson University</i> <i>Harvard University</i>
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Graduate Advisor Michael Brenner *Harvard School of Engineering and Applied Science*

Professional Appointments	Postdoctoral Associate, <i>Massachusetts Institute of Technology</i> with Tonio Buonassisi's Photovoltaics Lab	09/2013-09/2015
	Visiting Lecturer, <i>Brown University</i> with Shreyas Mandre in School of Engineering	10/2015 - 12/2015
	Acting Assistant Professor, <i>University of Washington</i> with Nathan Kutz in Dept. Applied Mathematics	01/2016- present
	Research Associate Consultant, <i>Institute for Disease Modeling</i> with Joshua Proctor	06/2016 – present

Peer Reviewed Publications C M Jakobson, M F Slininger, D Tullman-Ercek, **N M Mangan**[†]. *A systems-level model reveals that 1,2-propanediol utilization microcompartments enhance pathway flux through intermediate sequestration*. PLoS Comp. Bio. 13(5), e1005525 (2017). doi: 10.1371/journal.pcbi.1005525

R E Brandt, **N M Mangan**, J V Li, Y S Lee, and T Buonassisi. *Determining interface limits to open-circuit voltage in thin-film oxide solar cells* J. App. Phys. 121(18), 185301 (2017). doi: 10.1063/1.4982752

N M Mangan S L Brunton, J L Proctor, and J N Kutz. *Inferring biological networks by sparse identification of nonlinear dynamics*. IEEE Transactions on Molecular, Biological and Multi-Scale Communications, 2(1), 52-63 (2016). doi: 10.1109/TMBMC.2016.2633265 [Video Abstract](#)

N M Mangan^{*}, A Flamholz^{*}, R D Hood, R Milo, and D F Savage *pH determines the energetic efficiency of the cyanobacterial CO₂ concentrating mechanism* PNAS, 201525145 (2016). doi:10.1073/pnas.1525145113

N M Mangan, R E Brandt, V Steinmann, R Jaramillo, C Yang, R Chakraborty, J R Poindexter, R G Gordon, and T Buonassisi *A framework to predict optimal buffer-layer pairing with solar cell absorbers: A case study for zinc oxysulfide/ tin sulfide*. J. App. Phys. 118(11), 115102 (2015). doi:10.1063/1.4930581

R Chakraborty, V Steinman, **N M Mangan**, R E Brandt, J R Poindexter, R Jaramillo, J P Mailoa, K Hartman, A Polizzoti, C Yang, R G Gordon, and T Buonassisi, *Non-monotonic effect of growth temperature on carrier collection in SnS solar cells*. App. Phys. Lett., 106(20), 203901 (2015). doi:10.1063/1.4921326

D B Needleman, J P Mailoa, R E Brandt, **N M Mangan**, and T Buonassisi *Sensitivity Analysis of Optical Metrics for Spectral Splitting of Photovoltaic Systems: A Case Study* IEEE Journal of Photovoltaics 5(5), 1380-1388 (2015) doi: 10.1109/JPHOTOV.2015.2457292

M-J Sher, **N M Mangan**, M J Smith, YT Lin, S Marbach, T M Schneider, S Gradecek, M P Brenner and E Mazur *Femtosecond-laser hyperdoping silicon in a SF₆ atmosphere: Dopant incorporation mechanism*. J. App. Phys., 117(12), 125301 (2015). doi:10.1063/1.4914520

Y-T Lin, **N Mangan**, S Marbach, T M Schneider, G. Deng, S. Zhou, M P Brenner and E Mazur *Hyperdoped silicon with a flat doping profile: theoretical design and experimental realization*. App. Phys. Lett., 106(6), 062105 (2015). doi:10.1063/1.4907988

N M Mangan[†] and M P Brenner *Systems analysis of the CO₂ concentrating mechanism in cyanobacteria..* eLife, 2014(3). doi:10.7554/eLife.02043

N Mangan, C Reichhardt, C J Olson Reichhardt *Reversible to Irreversible Flow Transition in Periodically Driven Vortices*. Phys. Rev. Lett. 2008; 100 (18):187002

Y Y Kievsky, B Carey, S Naik, **N Mangan**, D Ben-Avraham, I Sokolov. *Dynamics of molecular diffusion of rhodamine 6G in silica nanochannels*. J. Chem. Phys. 2008; 128 (15):151102

M Reason, Y Jin, H A McKay, **N Mangan**, D Mao, R S Goldman, X Bai, and C Kurdak. *Influence of N on the electronic properties of GaAsN alloy films and heterostructures*. J. Appl. Phys., 102 (10), 103710 (2007)

Conference Proceedings

N Mangan and S Mandre. *Optimal distribution of riverine turbines in a linear array with systematic flow manipulation*. XXIV ICTAM, 21-26th August 2016, Montreal, Canada.

S Mandre, **N M Mangan**, T Derektor, and S Winckler. *A comparison of hydrokinetic turbines forming a vertical fence along the length of a river or tidal channel with a conventional rectangular turbine array*. METS, 25-27th April 2016, Washington, D.C.

R E Brandt, **N M Mangan**, J V Li, R C Kurchin, T Milakovich, S Levenco, E A Fitzgerald, T Unold, T Buonassisi, *Temperature-and intensity-dependent photovoltaic measurements to identify dominant recombination pathways*. IEEE 43rd Photovoltaic Specialist Conference (PVSC) (pp. 1997-2001). IEEE. (2016) 10.1109/PVSC.2016.7749978

J R Poindexter, R E Brandt, **N M Mangan**, and T Buonassisi, *Extracting mobility-lifetime product in SnS thin films using quantum efficiency analysis*. MRS Proceedings, 1771, mrss15-2131250. (2015) doi:10.1557/opl.2015.483

N M Mangan, R E Brandt, V Steinmann, R Jaramillo, J V Li, J R Poindexter, K Hartman, L Sun, R G Gordon, and T Buonassisi, *A path to 10% efficiency for tin sulfide devices*. IEEE 40th Photovoltaic Specialist Conference (PVSC) (pp. 2373-2378). IEEE. (2014) doi:10.1109/PVSC.2014.6925404

Pre-prints

N M Mangan, J N Kutz, S L Brunton, J L Proctor, *Model selection for dynamical systems via sparse regression and information criteria*.(2017) arXiv:1701.01773 [physics.data-an]

S Mandre and **N M Mangan** *Framework and limits on energy density in wind, tidal, and riverine device arrays using systematic flow manipulation* (2016) arXiv:1601.05462 [physics.flu-dyn]

† corresponding author. Mentored students.

Invited talks

N M Mangan *Systems analysis of reactions in bacterial microcompartments*. CCM9: The IXth International Symposium on Inorganic Carbon Utilization by Aquatic Photosynthetic Organisms. August 2016. Clare College, Cambridge, UK.

N M Mangan, S L Bruton, J L Proctor, and J N Kutz, *Inferring biological networks by sparse identification of nonlinear dynamics* Institute for Disease Modeling. June 2016. Bellevue, WA.

N M Mangan, M P Brenner, A Flamholz, R Milo, and D Savage. *Organization of metabolic reactions for improved efficiency: carbon fixation and bioengineering applications*. Energy Biosciences at University of California, Berkeley. July 2015. Berkeley, CA.

N M Mangan, M P Brenner *RuBisCO, carbonic anyhdrase, cellular organization and the carbon concentrating mechanism*, Massachusetts Institute of Technology CO₂ seminar series, May 2013. Cambridge, MA.

Conference Presentations

N Mangan and S Mandre. *Optimal distribution of riverine turbines in a linear array with systematic flow manipulation*. Poster at XXIV ICTAM, Montreal, Canada 21-26th August 2016

N M Mangan, S L Brunton, J L Proctor, and J N Kutz. *Inferring biological networks by sparse identification of nonlinear dynamics* Mini-symposium speaker at SIAM Annual Meeting. Boston, MA July 15, 2016.

N M Mangan and Michael Brenner. *Organization of metabolic reactions for improved efficiency: carbon fixation and bioengineering applications* Mini-symposium organizer and speaker at SIAM Applications of dynamical systems conference. Snowbird, UT. May 2015.

N M Mangan, R E Brandt, V Steinmann, R Jaramillo, J R Poindexter, K Hartman, C Yang, R G Gordon, and T Buonassisi *Systematic Determination of the Efficiency Limiting Factors to Accelerate the Development of Photovoltaic Materials* Poster, presented at Fall Materials Research Society Meeting Dec. 2nd 2014, Boston, MA

N M Mangan, R E Brandt, V Steinmann, R Jaramillo, J V Li, J R Poindexter, K Hartman, L Sun, R G Gordon, and T Buonassisi, *A path to 10% efficiency for tin sulfide devices*. Poster presented at IEEE 40th Photovoltaic Specialist Conference (PVSC). Denver, CO June 2014.

N M Mangan, M P Brenner *Organizing biochemical reactions: Lessons from cyanobacteria*. Poster, presented at Boston Bacterial Meeting. Cambridge, Massachusetts June 2012.

N M Mangan, M P Brenner *Organizing biochemical reactions: Lessons from cyanobacteria*. Talk, presented at APS March Meeting. Boston, MA February 2012.

N M Mangan, M P Brenner *Organizing biochemical reactions: Lessons from cyanobacteria*. Poster, presented at Dynamics Days. Baltimore, MD January 2012.

N M Mangan, T M Schneider, and M P Brenner, in collaboration with M-J Sher, Y-T Lin, A Aspuru-Guzik, C Friend, and E Mazur. *Modeling femto-second laser doping: A path to high efficiency solar cells*. Poster, presented at Scialog sponsored by Research Corporation. Biosphere 2, Tuscon, AZ October 2011.

**Teaching
Experience**

Applied Linear Algebra and Numerical Analysis, (Professor) Spring and Fall 2016
Department of Applied Mathematics, University of Washington
Course Websites: [Spring 2016](#), [Fall 2016](#)
YouTube Example Lecture: [Finite Differences for Higher-Order Derivatives](#)

Mathematical Modeling (Teaching Assistant) Fall 2011
with William Bossert, Harvard School of Engineering and Applied Science

Applied Mathematics (Teaching Assistant) Fall 2010
with Michael Brenner, Harvard School of Engineering and Applied Science

References

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Tonio Buonassisi *Postdoc Advisor*
Massachusetts Institute of Technology, Department of Mechanical Engineering
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Colleen Cavanaugh *PhD Committee Member*
Edward C. Jeffery Professor of Biology, Harvard University
4083 BioLabs, 16 Divinity Ave, Cambridge MA 02138
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**Honors and
Awards**

Lynch Foundation Fellowship 2009
NSF Graduate Fellowship August 2008

**Synergistic
Activities**

Comprehensive Environmental Assessment and Synthetic Biology Applications
*Woodrow Wilson International Center for Scholars, Science, Technology & Innovation
Program*
July 28th, 2011

Joined bioengineers, ecologists, industry representatives, regulators, and public interest groups in an evaluation of a scenario of the release of cyanobacteria engineered to produce sugars at an industrial scale are released into the environment. Aided in leading discussion on the use of a comprehensive environmental assessment to evaluate the risks associated with genetically modified organisms and identify knowledge gaps and future areas of research needed to mitigate identified risks.

Black Silicon development meetings with academia, industry, and government
MIT, Harvard, SiOnyx, and Benét Laboratories
Fall 2009 to Spring 2013

Participate in discussions of ongoing research at monthly meetings, for the purpose of advancing control of formation and understanding of physical properties of Black

Silicon. Designed a train of laser pulses to produce optimal material properties.

Harvard Graduate Consortium on Energy and the Environment

Sept 2009 to April 2011

Learned about all aspects of climate change and energy from the science and technology to the economic and social issues. Included courses on energy technology (Mike Aziz), climate and environmental science (Dan Schrag), and energy economics and policy (Bill Hogan). Participated in weekly seminars and discussions lead by experts doing research in a related area.

Other Writing

Mangan, Niall. *Green Energy from Bacteria*. Science in the News Flash. August 15, 2011, [Online Access](#), Retrieved October 1, 2016.

Kevin Vora and Niall Mangan. Jeffery Sachs: *Calling Academics, Research Communities and Companies to Make Up for Political Shortcomings*. The Energy Collective. April 14, 2011. [Online Access](#) Retrieved October 1, 2016.