

Daniel B. Turner-Evans

Janelia Research Campus

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EDUCATION

California Institute of Technology, Pasadena, CA

- PhD in Applied Physics, laboratory of Dr. Harry Atwater 2008-2013
- Thesis: Wire Array Photovoltaics

Yale University, New Haven, CT

- B.S. in Applied Physics and in Electrical Engineering, cum laude 2004-2008

CURRENT EMPLOYMENT

Janelia Research Campus, Howard Hughes Medical Institute, Ashburn, VA

Postdoctoral Associate

2013 – present

AWARDS

- Graduate Dean's Award for service to the Caltech community 2013
- National Science Foundation Fellowship 2009-2013
- Henry Prentiss Becton Prize for Excellence in Eng. and Applied Science 2008
- James Andrew Haas Prize 2008
 - "for inspiring in classmates a love of learning and concern for others"
- Belle and Carl Morse Junior Prize in Engineering and Applied Science 2007
- F. Wilder Bellamy, Jr., Memorial Prize 2007
 - for "high spirits, capacity for enjoyment, integrity and loyalty"

RESEARCH DIRECTION

The central complex is an area of the *Drosophila* brain associated with navigation. Within this region, distinct populations of neurons track the fly's orientation through a putative ring attractor network. I work to characterize the visual and motor inputs to this network using two-photon imaging of red and green calcium indicators while the fly walks on a ball and explores virtual worlds. I also employ opto- and thermogenetics when appropriate and use theory, simulations, and rigorous data analysis to glean insight into the underlying mechanisms.

TALKS

1. **How to move a compass needle: angular velocity integration in the *Drosophila* central complex.** SfN Neuroscience 2016. November 14, 2016. Poster. Highlighted as a Hot Topic.
2. **Visual inputs to a neural representation of heading in *Drosophila*.** SfN Neuroscience 2016. November 14, 2016. Poster.
3. **The contributions of self-motion and visual cues to a neural representation of heading.** Neuronal Circuits at Cold Spring Harbor Labs. April 8, 2016. Selected for talk.
4. **The relative effects of self-motion and visual cues to a neural representation of heading.** Central Complex IV at Janelia Research Campus. March 21, 2016. Selected for talk.
5. **Multi-electrode extracellular electrophysiology from optogenetically identified neurons in the *Drosophila* central complex.** Minibrains, hosted by the European Science Foundation. Nov. 8, 2013. Poster.
6. **III-V on SiGe tandem wire array solar cells.** Materials Research Society Fall Meeting. Nov. 27, 2012. Selected for talk.
7. **Tandem wire array solar cells.** Materials Research Society Spring Meeting. April 9, 2012. Poster.
8. **Optoelectronic design of multijunction wire-array solar cells.** IEEE Photovoltaic Specialists Conference. June 19, 2011. Poster.
9. **GaP on Si radial junction wire array solar cells.** Materials Research Society Spring Meeting. April 8, 2010. Selected for talk.

PUBLICATIONS

1. **Turner-Evans, D.B.** et al. (2016) Visual inputs to a neural representation of heading in *Drosophila*. In preparation
2. **Turner-Evans, D.B.** et al. (2016) Angular velocity integration in the *Drosophila* central complex. In preparation
3. **Turner-Evans, D.B.** and Jayaraman, V. (2016) The insect central complex. *Current Biology*, 26; R453-R457
4. Kim, S.S., et al. (2015). Optogenetics in *Drosophila melanogaster*. A.D. Douglass, series editor. In *New Techniques in Systems Neuroscience*, Springer. New York, NY.
5. Chen, C.T., et al. (2015) Cu-catalyzed vapor-liquid-solid growth of SiGe microwire arrays with chlorosilane and chlorogerman precursors. *Crystal Growth and Design*, 15; 3684-3689
6. **Turner-Evans, D.B.**, et al, (2012) Flexible, transparent contacts for inorganic nanostructures and thin films. *Advanced Materials*, 25; 4018-4022
7. **Turner-Evans, D.B.** et al, (2012) Optoelectronic analysis of simulated multijunction wire array structures. *Journal of Applied Physics*, 114; 014501
8. Strandwitz, N.C., **D. B. Turner-Evans**, et al. (2012) Photoelectrochemical Behavior of Planar and Microwire-Array Si/GaP Electrodes. *Advanced Energy Materials*, 2; 1109-1116
9. Tamboli, A.C., et al. (2012) Wafer scale growth of silicon microwire arrays for photovoltaics and solar fuel generation. *IEEE Journal of Photovoltaics*, 2; 294-297
10. **Turner-Evans, D.B.**, et al. (2011) Optoelectronic Design of Multijunction Wire-Array Solar Cells. Photovoltaic Specialists Conference (PVSC), 2011 36th IEEE.
11. Kelzenberg, M.D.*, **D.B. Turner-Evans***, et al. (2011) High-performance Si microwire photovoltaics. *Energy & Environmental Science* 4(3): 866-871.
12. Boettcher, S. W., E. L. Warren, et al. (2011) Photoelectrochemical Hydrogen Evolution Using Si Microwire Arrays. *Journal of the American Chemical Society* 133(5): 1216-1219.
13. Tamboli, A.C.*, **D.B. Turner-Evans***, et al. (2010) GaP/Si wire array solar cells. Photovoltaic Specialists Conference (PVSC), 2010 35th IEEE.
14. Tamboli, A.C., et al. (2010) Conformal GaP layers on Si wire arrays for solar energy applications. *Applied Physics Letters* 97(22): 221914-221913.
15. Putnam, M. C., et al. (2010) Si microwire-array solar cells. *Energy & Environmental Science* 3(8): 1037-1041.
16. Kelzenberg, M.D., et al. (2010) Enhanced absorption and carrier collection in Si wire arrays for photovoltaic applications. *Nature Materials* 9(3): 239-244.
17. Boettcher, S.W., et al. (2010) Energy-Conversion Properties of Vapor-Liquid-Solid-Grown Silicon Wire-Array Photocathodes. *Science* 327(5962): 185-187.
18. Putnam, M.C., **D.B. Turner-Evans**, et al. (2009) 10 μm minority-carrier diffusion lengths in Si wires synthesized by Cu-catalyzed vapor-liquid-solid growth. *Applied Physics Letters* 95(16): 163116-163113.
19. Kelzenberg, M.D., et al. (2009) Predicted efficiency of Si wire array solar cells. Photovoltaic Specialists Conference (PVSC), 2009 34th IEEE.
20. Kelzenberg, M.D., **D.B. Turner-Evans**, et al. (2008) Photovoltaic measurements in single-nanowire silicon solar cells. *Nano Letters* 8(2): 710-714.
21. Kelzenberg, M.D., **D.B. Turner-Evans**, et al. (2008) Single-nanowire Si solar cells. Photovoltaic Specialists Conference, Photovoltaic Specialists Conference (PVSC). 2008 33rd IEEE.
22. Stern, E., et al. (2007) Label-free immunodetection with CMOS-compatible semiconducting nanowires. *Nature* 445(7127): 519-522.
23. Stern, E., et al. (2006) Electropolymerization on microelectrodes: Functionalization technique for selective protein and DNA conjugation. *Analytical Chemistry* 78(18): 6340-6346.
24. Stern, E., G. Cheng, et al. (2006) Methods for fabricating Ohmic contacts to nanowires and nanotubes. *Journal of Vacuum Science & Technology B* 24(1): 231-236.

25. Stern, E., G. Cheng, et al. (2006) Comparison of laser-ablation and hot-wall chemical vapour deposition techniques for nanowire fabrication. *Nanotechnology* 17(11): S246-S252.
26. Stern, E., G. Cheng, et al. (2005) Electrical characterization of single GaN nanowires. *Nanotechnology* 16(12): 2941-2953.
27. Cheng, G. S., E. Stern, et al. (2005) Electronic properties of InN nanowires. *Applied Physics Letters* 87(25).

PATENTS

1. **Device for generating photoelectrochemical e.g. syngas in transportation applications, has core comprising array of wires and conformal coating placed on array of wires of core, where coating comprises inorganic semiconductor material.** US2015267308-A1
2. **Microstructure, particularly wire array, structure used in solar cell and device or photocell for converting solar energy to electricity has array of semiconducting rods coated with wider band-gap coating material.** US9263612-B2
3. **Nano-wire sensor useful in integrated complementary metal oxide semiconductor system to perform signal process, error detection/complementary error detection, comprises semiconductor layer formed on substrate, and channel with lateral face.** US2016054315-A1
4. **Selectively patterning three-dimensional structure involves embedding portion of structure with material having embedded and unembedded portion of the structure, filling a space within spaced elements; and patterning unembedded portions.** EP2507843-A2

OTHER EMPLOYMENT

- **Research Scientist for Caelux** Summer 2013
I helped to found and then briefly worked for a start-up that sought to commercialize the technology that I developed during my PhD at Caltech.
- **Teaching Assistant**
 - APh 114 a,b,c: Solid State Physics 2009-10,11-12
Sample Student Comments:
"Dan is awesome. He knew the material very well, and was helpful to students in his office hours. He is very friendly, and supportive. I really enjoyed working with him."
"Well organized and good lecturer, seems to put in a lot of effort to being a good TA."
 - CS/EE/ME 75 a,b,c: Solar Decathlon 2010/11
 - APh 24c: Introductory Modern Optics Laboratory 2010
- **Summer Undergraduate Research Fellowship at Caltech** Summer 2007
- **Grader for EE229: Signals and Systems Lab** 2007
- **Student Taskforce for Environmental Partnership Coordinator** 2006/07
- **Reed Lab at Yale, Research Assistant** 2005/07
Researched nanowire sensors
- **MIT Vehicle Design Summit, Team Leader for the Biofuel Concept** Summer 2006
Appeared in a Discovery Channel documentary about the project.

EXTRACURRICULAR ACTIVITIES

- **Janelia**
 - Led high school biology neuroscience module 2014
 - Volunteered at Girls in Technology, Loudoun 2014
- **Caltech**
 - Served on the Caltech Mental Health Committee 2011-2013
 - Mentored summer undergraduate researchers 2009-2012
 - Taught robotic and physics at Marshall Middle School 2011/12
 - Science Fair Judge 2011/12
 - Captain of Soccer, Flag Football, and Softball Intramural Teams 2010/12

REFERENCES

Vivek Jayaraman

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Harry Atwater

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