

John P. Sadowski, Ph.D.

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I combine technical expertise in DNA nanotechnology with a strong focus on policy and outreach. My research focuses on developing dynamic nucleic acid systems that can respond to and control their chemical and physical environment in intricate ways, and the computational methods for designing them.

Education

Harvard University, Cambridge, MA

Ph.D., Chemistry, 2013

Dissertation title: Design and synthesis of dynamically assembling DNA nanostructures

M.A., Chemistry, 2009

California Institute of Technology, Pasadena, CA

B.S. with Honor, Chemistry, minor in History & Philosophy of Science, 2007

Scientific experience

U. S. Naval Research Laboratory Center for Bimolecular Science and Engineering

ASEE Postdoctoral Research Fellow (2014–2015)

- Developed theory for design of scalable DNA gridiron nanostructures using dynamic self-assembly; obtained preliminary experimental results
- Designed multi-component three-dimensional FRET cascade scaffolded by solid DNA nanostructure
- Awarded American Society for Engineering Education Postdoctoral Fellowship

National Academy of Sciences Board on Chemical Science and Technology

Mirzayan Science and Technology Policy Fellow (2014)

- Contributed to report on the industrialization of synthetic biology for advanced chemical manufacturing

Harvard University Department of Chemistry and Chemical Biology

Graduate Student in Chemistry

Advisor: Prof. Peng Yin (2010–2013)

- Successfully created and characterized the first well-defined three-dimensional nanostructure using dynamic DNA self-assembly
- Programmed a general software tool to design sequences for large, complex nucleic acid systems
- Performed basic science research on the kinetics of DNA hairpin opening reactions
- **First-author publication** in *ACS Nano*

Advisor: Prof. David Liu (2007–2009)

- Investigated creating macroscopic programmable matter by using designed surface DNA interactions
- Programmed computer software to design nucleic acid sequences for programmable matter particles
- **Received fellowships:** National Science Foundation Graduate Research Fellowship and Buttonwood Foundation Booker Graduate Scholarship

California Institute of Technology Department of Chemistry

Undergraduate Research Fellow

Advisor: Prof. Peter Dervan (2004–2007)

- Successfully created and characterized a new class of DNA–organic complexes for templated molecular self-assembly, enabling precise placement of single-molecule components on DNA arrays
- Awarded Caltech's Bonsall Prize for Technical Writing, and Schuster Prize for merit in chemistry
- **Research published** in *Angewandte Chemie* and *Journal of the American Chemical Society*

Advisor: Prof. James Heath (2003)

- Contributed to fabrication of a nanoscale biosensor to provide real-time monitoring of cellular molecules
- Awarded Caltech's Bonsall Prize for Technical Writing

New York University Department of Chemistry

Visiting high school student

Advisor: Prof. Nadrian Seeman (2001–2003)

- Created and characterized DNA nanostructures for potential use in molecular electronics
- Spent over 500 hours in the laboratory working on this project while attending high school
- **National finalist** in Intel, Siemens–Westinghouse, and JSHS competitions

Additional policy and communications experience

Wikimedia District of Columbia

Treasurer (2016–present); Member of Board of Directors (2014–present)

- Serving on Public Policy Committee (since 2014) and Audit Committee (since 2016)
- Initiated and managed development of chapter's position on federal orphan works legislation, and public domain status of California state government works
- Delivered training sessions to Office of Science and Technology Policy, American Chemical Society (5 times), American Geophysical Union, National Academies, Department of Defense, and Harvard Kennedy School (three times)
- Brought in new institutional partners through networking

Wikipedia

Contributor (2006–present)

- Made over 17,000 edits, mostly on nanotechnology, biomolecular structure, and science policy
- Contributed to 58 articles that appeared on the Main Page in the *Did you know...* section
- Primary contributor to *DNA nanotechnology* article, which was promoted to Featured Article status; and to *Holliday junction*, *John Marburger, 2012 United States federal budget*, *Drexler–Smalley debate on molecular nanotechnology*, and *Caltech–MIT rivalry*, all promoted to Good Article status.

Leadership experience

- Founding chairperson of Graduate Commons Resident Council, an organization at my residence at Harvard tasked with fostering community in the building
- Served on Avery Council, the governing body of Avery House student residence at Caltech
- Chairperson of Avery Constitutional Convention: managed the process to create a new constitution for Avery House; presided over meetings to create an acceptable consensus on controversial issues
- In high school: senior class president, school vice president, chair of Class Constitutional Convention

Media and performing arts experience

- Co-wrote, directed, edited, and acted in an original short film based on the television series *24*.
- Acted in three musicals and nine straight plays at Caltech and MIT: Shakespeare's *Macbeth*, *Measure for Measure*, *As You Like It*, and *The Winter's Tale*; Chekhov's *The Boor*; *R.U.R. (Rossum's Universal Robots)*, *The Drowsy Chaperone*, *The Wedding Singer*, *Young Frankenstein*, *Sonne*, *Too Much Light Makes the Baby Go Blind*, and *Epic Proportions*; and in two short films: *24: Avery House* and *The Bourne Assassination*
- Piano, clarinet, chorus, ballroom dance experience

Teaching experience

Instructor

How to improve Wikipedia (and your career) without getting the Internet mad at you (Winter 2013)

- Sole instructor of two-week course taught during January term at Harvard University
- Prepared lesson plans and assignments; gave lectures; assisted students with written work

Teaching Fellow

Physical Sciences 1. Chemical Bonding, Energy, and Reactivity: An Introduction to the Physical Sciences

Instructors: Prof. James Anderson and Prof. Efthimios Kaxiras (Harvard University, Spring 2008)

- Prepared lesson plans for sections; taught two sections per week; graded sets and exams

Chemistry 161. Statistical Thermodynamics

Instructor: Prof. Xiaowei Zhuang (Harvard University, Spring 2009)

- Prepared lesson plans for sections; taught one section per week; wrote and graded sets and exams

Campus Ambassador

Communications 325. Public Relations Seminar (Simmons College, Spring 2011)

PL 882. Public Policy Analysis: Public Roles in Private Markets (Boston University Business School, Spring 2011)

- Volunteer position to instruct classes about Wikipedia content policies and community
- Taught 2 lectures; designed assignments with professor; assisted students with written work

Guest lectures and tutorials

- Guest lecture tutorials on Nano engineer-1 molecular design software, as part of course taught by my advisor, Biomolecular Engineering and Synthetic Biology (four times, 2011–2013)
- Science Policy Group at the Harvard Graduate School of Arts and Sciences.: led discussion group on John Marburger's term as George W. Bush's science advisor
- Philosophy of Science Society at Harvard: led two discussion groups, on biological determinism and on fringe theories about DNA structure

Publications

1. **Multisubjective: nucleic acid design through fast removal of undesired secondary structure**
John P. Sadowski. Submitted (2016).
2. **Developmental self-assembly of a DNA tetrahedron**
John P. Sadowski, Colby R. Calvert, David Yu Zhang, Niles A. Pierce, and Peng Yin. *ACS Nano* 8, 3251–9 (2014). <http://dx.doi.org/10.1021/nn4038223>
3. **Programming multiple protein patterns on a single DNA nanostructure**
Justin D. Cohen, John P. Sadowski, and Peter B. Dervan. *Journal of the American Chemical Society* 130, 402–3 (2008). <http://dx.doi.org/10.1021/ja0772400>
4. **Addressing single molecules on DNA nanostructures**
Justin D. Cohen, John P. Sadowski, and Peter B. Dervan. *Angewandte Chemie Int'l Ed* 46, 7956–9 (2007). <http://dx.doi.org/10.1002/anie.200702767>

Non-technical publications

How the Internet changed chemistry: spreading science globally with Wikipedia

John P. Sadowski. *Chemical & Engineering News*, 17 August 2015. <http://internet.cenmag.org/spreading-science-globally-with-wikipedia/>

Conferences and seminars

Technical

American Chemical Society 252nd National Meeting, Philadelphia, PA (2016) [Poster]
George Mason University Department of Chemistry and Biochemistry, Fairfax, VA (2016) [Departmental seminar]
DNA Computing and Molecular Programming 21, Boston, MA (2015) [Poster]
Technische Universität Dresden Center for Advancing Electronics, Dresden, Germany (2015) [Departmental seminar]
DNA Computing and Molecular Programming 20, Kyoto, Japan (2014) [Poster]
MAD Nano 1, Baltimore, MD (2014) [Invited talk]
DNA Computing and Molecular Programming 19, Tempe, AZ (2013) [Contributed talk]
DNA Computing and Molecular Programming 18, Aarhus, Denmark (2012) [Poster]
Harvard University Department of Systems Biology, Boston, MA (2011) [Departmental seminar]

Policy

WikiConference North America, San Diego, CA (2016) [Contributed panel discussion]
Wikimedia Affiliates Conference, Berlin, Germany (2015) [Invited talk]

Honors and awards

American Society for Engineering Education Postdoctoral Fellowship (2014)
National Academy of Sciences Christine Mirzayan Science & Technology Policy Graduate Fellowship (2014)
National Science Foundation Graduate Research Fellowship (2008)
Buttonwood Foundation J. Marshall & Jane H. Booker Graduate Scholarship (2007)
Caltech Axline Merit Award: 4-year full scholarship to Caltech (2003–2007)
Caltech Richard P. Schuster Memorial Prize for academic merit in chemistry (2007)
Caltech University College London Scholars Program: one term of study abroad (2006)
Caltech Marcella and Joel Bonsall Prize for Technical Writing (twice, 2003 and 2004)
Caltech Summer Undergraduate Research Fellowship (four times, 2003–2006)
Junior Science and Humanities Symposium Second Place National Winner in Physical Sciences (2003)
Intel Int'l Science & Engineering Fair 1st Prize American Chemical Society Award, 3rd Award for Chemistry (2003)
Intel Science Talent Search Semifinalist (2003)
Siemens–Westinghouse Competition Regional Finalist (2002)
American Legion Boys' State of New York (2002)
United States Senate Youth Program Semifinalist (2001)
Eagle Scout with three palms (2001)
Johns Hopkins CTY Talent Search 1st place national in math, 2nd place New York state combined score (1999)

Press

“Geophysical scientists take red pencils to Wikipedia.” Allison Torres Burtka. *Associations Now*, 3 October 2016.
“Working with Wikipedia: collaboration is key for chemists contributing to the online encyclopedia.” Matt Davenport. *Chemical & Engineering News*, 14 September 2015.
“Chemistry Ambassadors member spotlight: John Sadowski.” American Chemical Society. September 2014.
“Caltech relaxes with Shakespeare’s every word.” Stephanie Chavez. *Los Angeles Times*, 30 May 2004.
“Sensitive support of gifted student.” John Hildebrand. *Newsday*, 6 May 2003.
“Fourth grader attends high school.” Noah Melnick. *Viking View* (North Shore High School, NY), April 1995.

November 1, 2016