

**ERIK WINFREE**

Assistant Professor of Computer Science and Computation & Neural Systems  
California Institute of Technology, Mail Code 136-93, Pasadena, California 91125  
Telephone: 626-395-6246, Fax: 626-584-0630  
E-Mail: [winfree@caltech.edu](mailto:winfree@caltech.edu), Web: [www.dna.caltech.edu/~winfree/](http://www.dna.caltech.edu/~winfree/)

**Professional Preparation:**

University of Chicago, with Honors, Mathematics (specialization in Computer Science), B.S., 1991  
California Institute of Technology, Computation & Neural Systems, Ph.D., 1998  
Princeton University, Department of Molecular Biology, Lewis Thomas Postdoctoral Fellow, 1998-1999

**Professional Appointments:**

1999-present Assistant Professor of Computer Science and Computation & Neural Systems  
1999-2000 Visiting Scientist, MIT Artificial Intelligence Laboratory

**Closely Related Publications:**

1. Barish, R. D., Rothmund, P.W.K., Winfree, E., "Two Computational Primitives for Algorithmic Self-Assembly: Coping and Counting," *Nano Letters* **5**(12):2586-2596 (2005).
2. Rothmund, P.W.K., Papadakis, N., and Winfree, E., "Algorithmic Self-Assembly of DNA Sierpinski Triangles," *Public Library of Science Biology* **2**(12): e424 (2004).
3. Rothmund, P.W.K., Ekani-Nkodo, A., Papadakis, N., Kumar, A., Fygenson, D.K., and Winfree, E., "Design and Characterization of Programmable DNA Nanotubes," *Journal of the American Chemical Society* **126**(50): 16344-16353 (2004).
4. Schulman, R. and Winfree, E., "Programmable Control of Nucleation for Algorithmic Self-Assembly," *DNA Computing: 10<sup>th</sup> International Workshop on DNA-Based Computers, June 7-10, 2004, Lecture Notes in Computer Science*, 3384:319-328 (2005).
5. Cook, M., Rothmund, P.W. K., and Winfree, E., "Self-Assembled Circuit Patterns," *DNA Computing: 9<sup>th</sup> International Workshop on DNA-Based Computers, June 1-4, 2003. Lecture Notes in Computer Science*, **2943**, 91-107 (2004).

**Other Significant Publications:**

1. Dirks, R.M., Lin, M., Winfree, E., and Pierce, N. A., "Paradigms for Computational Nucleic Acid Design," *Nucleic Acid Research* **32**(4): 1392-1403 (2004).
2. Seelig, G., Yurke, B. and Winfree, E., "DNA Hybridization Catalysts and Catalyst Circuits," *DNA Computing: 10<sup>th</sup> International Workshop on DNA-Based Computers, June 7-10, 2004, Lecture Notes in Computer Science*, 3384:329-343 (2005).
3. Rothmund, P.W.K., and Winfree, E., "The Program-Size Complexity of Self-Assembled Squares," *Symposium on Theory of Computing (STOC), May 21-23, 2000*.
4. Winfree, E. and Bekbolatov R., "Proofreading Titles Sets: Error Correction for Algorithmic Self-Assembly," *DNA Computing: 9<sup>th</sup> International Workshop on DNA-Based Computers, June 1-4, 2003, Lecture Notes in Computer Science*, **2943**, 126-144 (2004).
5. Winfree, E., Liu, F., Wenzler, L.A., and Seeman, N.C., "Design and Self-Assembly of Two-Dimensional DNA Crystals," *Nature* **394**, 539-544 (1998).

**Awards and Honors:**

NSF PECASE (2002)  
ONR Young Investigator (2001)  
MacArthur Fellow (2000)  
MIT Technology Review TR100 (1999)  
Caltech Distinguished Teaching Assistant award (1997)

**Current Research Interests:**

- Models of biomolecular computation.

- Physical limits of biomolecular computation.
- Algorithmic self-assembly of DNA structures for computation and for nanofabrication.
- Synthetic transcriptional networks.
- Design of DNA structures, kinetic pathways, and nanomechanical devices.

**Professional Memberships:**

American Association for the Advancement of Science  
 American Chemistry Society  
 Association for Computing Machinery  
 Mathematical Association of America

**Other Professional Activities:**

- Advisory Board, Springer-Verlag Series on Natural Computation (1999-present)
- Co-organizer, Computing Beyond Silicon Summer School (Caltech, 2003-present)
- Participant in NSF Qubic Panel (2003)
- Program Committee, Conferences on DNA-Based Computers (1997-2001 & 2003)
- Participant in NASA BIN Fusion Invitation Workshop (2002)
- CRA advisory on DNA computing, to House of Representatives (2000)
- Panelist, NIH BECON Nanoscience and Nanotechnology: Shaping Biomedical Research (2000)
- Co-organizer, 5<sup>th</sup> Conference on DNA-Based Computers (MIT, 1999)
- Co-organizer, DIMACS Workshop on Evolution as Computation (Princeton, 1999), Participant (Rutgers, 2003)
- Participant in NSF DNA/Biomolecular Computing Workshop (1996)

**Collaborators and Co-editors other than those cited in the publication list:**

Leonard Adleman, USC  
 Jehoshua Bruck, Caltech  
 Peter Gacs, Boston University  
 Ashish Goel, Stanford  
 John Hopfield, Princeton  
 William Goddard, Caltech  
 Laura Landweber, Princeton  
 Hideo Mabuchi, Caltech  
 Milan Stojanovic, Columbia  
 Grzegorz Rozenberg, U. Leiden

**Graduate and post-graduate advisors and advisees:**

John J. Hopfield, Graduate advisor, Princeton  
 Stanislaw Leibler, Post-graduate advisor, Princeton

***Current Advisees:***

Sung Ha Park (postdoc)  
 Paul W. K. Rothmund (postdoc)  
 Georg Seelig (postdoc)  
 Rizal Hariadi (graduate student)  
 Jongmin Kim (graduate student)  
 Joseph Schaeffer (graduate student)  
 Rebecca Schulman (graduate student)  
 David Soloveichik (graduate student)  
 David Zhang (graduate student)  
 Rob Barish (undergraduate student)  
 Jing Chen (undergraduate student)  
 Pakpoom Subsoontorn (undergraduate student)