

MICHAEL F. HAGAN

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EDUCATION

University of California Berkeley, California
Ph. D. in Chemical Engineering, November 2003
Thesis: "Simulation of Biomolecular Nanomechanical Systems"
Thesis Advisor: Prof. Arup K. Chakraborty GPA 3.89/4.0

University of Connecticut Storrs, Connecticut
B. S. E. in Chemical Engineering, May 1998
summa cum laude GPA 3.84/4.0

PROFESSIONAL EXPERIENCE

Brandeis University Waltham, Massachusetts
Department of Physics *January 2007 – Present*
Assistant Professor

University of California Berkeley, California
Department of Chemistry *November 2003 – December 2006*
Postdoctoral Fellow with Prof. David Chandler

University of California Berkeley, California
Department of Chemical Engineering *August 1998 – November 2003*
Graduate Student Researcher with Prof. Arup K. Chakraborty

- Modeled DNA hybridization in micro-devices using atomistic molecular dynamics and coarse-grained field theoretic techniques.
- Co-wrote transition path sampling module for CHARMM, a publicly distributed program for high-resolution simulations of biological macromolecules.

University of Connecticut Storrs, Connecticut
Department of Chemical Engineering *Summer 1998*
Undergraduate Researcher with Prof. Robert Fisher

TEACHING EXPERIENCE

Brandeis University Waltham, Massachusetts
Assistant Professor

• Numerical Modeling Methods in Biology *Spring 2007, Spring 2008*

Designed and taught new course to undergraduate and graduate students from physics, chemistry, biochemistry, and biology departments. Applied modern computational techniques to interesting and important problems in biology.

RESEARCH SUPPORT

National Institutes of Health NIAID (Award No. R01AI080791)
Multiscale Modeling of Mechanisms for Viral Capsid Assembly and Polymorphism
Total Costs: \$1,150,051 *December 2008 – November 2013*

JOURNAL ARTICLES

- Kivenson, A.; Hagan, M.F. "Mechanisms of Capsid Assembly around a Polymer", *submitted to PNAS*
- Hagan, M.F. "Understanding the Concentration Dependence of Viral Capsid Assembly Kinetics - the Origin of the Lag Time and Identifying the Critical Nucleus Size", submitted to *Biophys. J.*, arXiv:0905.0375
- Sumedha; Hagan, M.F.; Chakraborty, B. "Role of GTP remnants in microtubule dynamics", submitted to *Phys. Rev. Lett.*, [arXiv:0908.1199](https://arxiv.org/abs/0908.1199)
- Hagan, M.F. "A theory for viral capsid assembly around electrostatic cores", *J. Chem. Phys.*, 2009, *130*, 114902
- Elrad, O.M.; Hagan, M.F. "Mechanisms of size control and polymorphism in viral capsid assembly", *Nano Letters*, 2008, *8*, 3850-3857
- Huang, F.; Addas, K.; Ward, A.; Flynn, N.T.; Hagan, M.F.; Dogic, Z.; Fraden, S. "The pair potential of colloidal stars", *Phys. Rev. Lett.*, 2009, *102*, 108302
- Whitelam, S.; Feng, E.H.; Hagan, M.F.; Geissler, P.G. "The role of collective motion in examples of coarsening and self-assembly", *Soft Matter*, 2009, *6*, 1251-1262 (Special issue on Self-Assembly)
- Hagan, M. F. "Controlling viral capsid assembly with templating", *Phys. Rev. E*, 2008, *77*, 051904
- Jack, R. L.; Hagan, M. F.; Chandler, D. "Fluctuation-dissipation ratios in the dynamics of self-assembly", *Phys. Rev. E*, 2007, *76*, 021119
- Hagan, M. F.; Chandler, D. "Dynamic Pathways for Viral Capsid Assembly", *Biophys. J.*, 2006, *91*, 42
- Hagan, M. F.; Chakraborty, A. K. "Hybridization Dynamics of Surface Immobilized DNA", *J. Chem. Phys.*, 2004, *120*, 4958
- Hagan, M. F.; Dinner, A. R.; Chandler, D.; Chakraborty, A. K. "Atomistic Understanding of Kinetic Pathways for Single Base-Pair Binding and Unbinding in DNA", *Proc. Natl. Acad. Sci. USA*, 2003, *100*, 13922
- Hagan, M. F.; Majumdar, A.; Chakraborty, A. K. "Nanomechanical Forces Generated by Surface Grafted DNA", *J. Phys. Chem. B*, 2002, *106*, 10163
- Wu, G.; Haifeng, J.; Hansen, K.; Thundat, T.; Datar, R.; Cote, R.; Hagan, M. F.; Chakraborty, A. K.; Majumdar, A. "Origin of Nanomechanical Cantilever Motion Generated from Biomolecular Interactions", *Proc. Natl. Acad. Sci. USA*, 2001, *98*, 1560.

RECENT INVITED TALKS

- "Understanding biology's multifunctional containers -- how viral proteins dynamically encapsulate flexible polymers and rigid nanoparticles.", August 5, 2009
Computations in Science Seminars, University of Chicago, Chicago, IL
- "Dynamic simulations of models for viral capsid assembly around flexible polymers.", July 17, 2009
10th US National Congress on Computational Mechanics, Columbus, OH
- "Dynamic simulations of models for viral capsid assembly around flexible polymers.", July 13, 2009
Computer Simulation Approaches to Study Self-Assembly: from Patchy Nano Colloids to Virus Capsids, CECAM-HQ-EPFL, Lausanne, Switzerland
- "From solid nanoparticles to flexible polyanions -- the role of the packaged cargo in capsid assembly.", Feb. 17, 2009
Physical Virology Gordon Research Conference, Galveston, TX
- "How Viral Capsids Adapt to Mismatched Cargoes -- Mechanisms of Morphology Control.", Jan. 22, 2009
Boston University Biophysics Colloquium, Boston, MA
- "How Viral Capsids Adapt to Mismatched Cargoes -- Mechanisms of Morphology Control.", Jan. 21, 2009
Squishy Physics Seminar, Harvard University, Cambridge, MA

- “How viral capsids adapt to mismatched cargoes—identifying mechanisms of morphology control with simulations.”, Dec. 2, 2008
Materials Research Society symposium: Design, fabrication, and a self-assembly of "patchy" and anisometric particles, Boston, MA
- “How viral capsids adapt to mismatched cargoes—identifying mechanisms of morphology control with simulations.”, Nov 12, 2008
Clark University Physics Colloquium, Worcester, MA
- “How viral capsids adapt to mismatched cargoes—identifying mechanisms of morphology control with simulations.”, Oct. 18, 2008
Greater Boston Area Statistical Mechanics Meeting, Waltham, MA
- “How viral capsids adapt to mismatched cargoes—identifying mechanisms of morphology control with simulations.”, Sep. 12, 2008
New England Complex Fluids Workshop, Waltham, MA
- “Dynamic models for templated assembly of viral capsids”, June 25, 2008
FASEB Summer Research Conferences: Virus Structure and Assembly, Saxtons River, VT
- “Dynamic models for templated viral capsid assembly”, March 12, 2008
American Physical Society National Meeting, New Orleans, LA
- “Dynamic models for templated assembly of viral capsids”, October 5, 2007
Frontiers in the Theory of Soft Matter at the Nanoscale
Lawrence Berkeley National Laboratory Molecular Foundry User Meeting, Berkeley, CA

HONORS

- National Institutes of Health Ruth L. Kirchstein National Research Service Award, Individual Postdoctoral Fellowship, 2005
 - National Science Foundation Graduate Research Fellow, 1999
 - Eagle Scout, 1992
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