Mark Bathe
Curriculum Vitae

Education

2004	Ph.D., Mechanical Engineering, MIT
2001	M.Sc., Mechanical Engineering, MIT
1998	B.Sc., Mechanical Engineering, MIT

Postdoctoral Training

2006–2008	Alexander von Humboldt Postdoctoral Fellow, University of Munich

Professional Experience

2020–present	Professor, Department of Biological Engineering, MIT
2016–2020	Associate Professor with Tenure, Department of Biological Engineering, MIT
2013–2016	Associate Professor without Tenure, Department of Biological Engineering, MIT
2012–present	Associate Member, Broad Institute of MIT & Harvard
2009–2013	Assistant Professor, Department of Biological Engineering, MIT
2006–2008	Alexander von Humboldt Postdoctoral Fellow, University of Munich

Affiliations

Broad Institute of MIT & Harvard
MIT Center for Environmental Health Sciences
MIT Department of Mechanical Engineering
MIT Center for Neurobiological Engineering

Awards

2019	MIT Class of 1960 Fellow
2015	Joy Cappel Young Investigator Award
2014	MIT Freshman Advising Award
2009	Samuel A. Goldblith Career Development Professorship
2006	Alexander von Humboldt Postdoctoral Research Fellow
2001	National Defense Science and Engineering Graduate Fellow
1998	Elected member of Sigma Xi and Pi Tau Sigma Academic Honor Societies

Professional Societies

American Chemical Society
Biophysical Society
Society for Neuroscience

Research Interests

Nucleic Acid Nanotechnology
Molecular & Cellular Biophysics
Computational Biology & Biophysics
Therapeutic Nucleic Acid Delivery
Quantum Information Sensing & Processing

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Academic Service

2025	Co-Chair, Gordon Research Conference on RNA Nanotechnology
2023	Vice Co-Chair, Gordon Research Conference on RNA Nanotechnology
2019–present	Co-Director, MIT New Engineering Education Transformation
2019–2021	Editorial Board Member, Scientific Reports
2018–2020	Chair, MIT Committee on Student Life
2017–2019	MIT New Engineering Education Transformation Committee
2017–2018	Chair, MIT Department of Biological Engineering Graduate Academic Program
2016–present	MIT Department of Biological Engineering Graduate Admissions Committee
2016–present	SRC Roadmap Committee on Synthetic Biology Steering Committee
2015–present	MIT Institute Committee on Community Giving
2015–present	MIT Department of Biological Engineering Teaching Awards Committee
2015–2016	MIT Institute for Medical Engineering & Science Faculty Search Committee
2014–present	MIT Department of Biological Engineering Seminar Series Organizing Committee
2014	MIT Department of Biological Engineering Retreat Organizing Committee
2013–present	MIT Department of Biological Engineering Undergraduate Program Committee
2011–2012	MISTI Global Seed Funds Evaluation Committee
2011–2012	MIT Department of Mechanical Engineering Graduate Admissions Committee
2009–2017	MIT Computational & Systems Biology Graduate Program Admissions Committee
2009–2016	MIT Computational & Systems Biology Graduate Program Committee
2009–2013	MIT Department of Biological Engineering Graduate Admissions Committee
2008–2013	MIT Department of Biological Engineering Graduate Program Committee

Publications

1. Tomov, M.L., O'Neil, A., Abbasi, H.S., Cimini, B.A., Carpenter, A.E., Rubin, L.L., **Bathe, M.** Resolving cell state in iPSC-derived human neural samples with multiplexed fluorescence imaging. *Commun Biol.,* 4: 786 (2021).

2. Banal, J., Shepherd, T., Berleant, J., Reyes, M., Huang, H., Ackerman, C., Blainey, P., **Bathe, M.** Random access DNA memory using Boolean search in an archival file storage system. *Nature Materials,* (2021).

3. **Bathe, M**., Hernandez, R., Komiyama, T., Machiraju, R., Neogi, S. Autonomous computing materials. *ACS Nano*, 15: 3586 (2021).

4. Hart, S.M., Chen, W-J., Banal, J.L., Bricker, W.P., Dodin, A., Markova, L., Vyborna, Y., Willard, A.P., Häner, R., **Bathe, M.**, Schlau-Cohen, G.S. Engineering couplings for exciton transport using synthetic DNA scaffolds. *Chem*, 7: 752 (2021).

5. Danielson, E., de Arce, K.P., Cimini, B., Wamhoff, E-C., Singh, S., Cottrell, J.R., Carpenter, A.E., **Bathe, M.** Molecular diversity of glutamatergic and gabaergic synapses from multiplexed fluorescence imaging. *eNeuro*, 8: eneuro.0286-20.2020 1 (2021).

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6. Lan, T.C.T., Allan, M.F., Malsick, L.E., Khandwala, S., Nyeo, S.S.Y., **Bathe, M.**, Griffiths, A., Rouskin, S. Insights into the secondary structural ensembles of the full SARS-CoV-2 RNA genome in infected cells. *bioRxiv* (2020).

7. Afonin, K.A., Dobrovolskaia, M.A., Church, G., **Bathe, M.** Opportunities, barriers, and a strategy for overcoming translational challenges to therapeutic nucleic acid nanotechnology. *ACS Nano*, 14: 9221 (2020).

8. Dobrovolskaia, M.A., **Bathe, M.** Opportunities and challenges for the clinical translation of structured DNA assemblies as gene therapeutic delivery and vaccine vectors. *WIRES Nanomedicine and Nanobiotechnology*, 13: e1657 (2020).

9. Pisharady, P.K., Eberly, L.E., Cheong, I., Manousakis, G., Guliani, G., Clark, H.B., **Bathe, M.,** Walk, D., Lenglet, C. Tract-specific analysis improves sensitivity of spinal cord diffusion MRI to cross-sectional and longitudinal changes in amyotrophic lateral sclerosis. *Commun Biol.,* 3: 370 (2020).

10. Veneziano, R., Moyer, T.J., Stone, M.B., Mukherjee, S., Shepherd, T.R., Das, J., Schief, W.R., Irvine, D.J., **Bathe, M.** Role of nanoscale antigen organization on B-cell activation probed using DNA origami. *Nature Nanotechnology*, 15: 716 (2020).

11. Wamhoff, E-C., Huang, H., Read, B.J., Ginsburg, E., Schief, W.R., Farrell, N., Irvine, D.J., **Bathe, M.** Controlling wireframe DNA origami nuclease degradation with minor groove binders. *bioRxiv* (2020).

12. Hart, S.M., Banal, J.L., **Bathe, M.,** and Schlau-Cohen, G.S. Identification of non-radiative decay pathways in CY3. *J. Phys. Chem. Lett.* (2020).

13. Jun, H., Wang, X., Bricker, W., Jackson, S., **Bathe, M.** Rapid prototyping of wireframe scaffolded DNA origami using ATHENA. *bioRxiv* (2020).

14. Banal, J.L., Shepherd, T.R., Berleant, J.D., Huang, H., Reyes, M., Ackerman, C.M., Blainey, P., **Bathe, M.** Arbitrary Boolean logical search operations on massive molecular file systems. *bioRxiv* (2020).

15. Jun, H., Wang, X., Bricker, W.P., **Bathe, M.** Automated sequence design of 2D wireframe DNA origami with honeycomb edges. *Nature Communications*, 10: 5419 (2019).

16. Guo, S-M., Veneziano, R., Gordonov, S., Li, L., Danielson, E., Perez De Arce, K., Park, D., Kulesa, A.B., Wamhoff, E-C., Blainey, P.C., Boyden, E.S., Cottrell, J.R., **Bathe, M.** Multiplexed and high-throughput neuronal fluorescence imaging with diffusible probes. *Nature Communications*, 10: 4377 (2019).

17. Wamhoff, E-C., Banal, J.L., Bricker, T.R., Parsons, M.F., Veneziano, R., Stone, M.B., Jun, H., Wang, X., **Bathe, M.** Programming structured DNA assemblies to probe biophysical processes. *Annual Review of Biophysics*, 48: 395 (2019).

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18. Shepherd, T.R., Du, R., Huang, H., Wamhoff, E-C., **Bathe, M.** Bioproduction of pure, kilobase-scale single-stranded DNA. *Scientific Reports*, 9: 6121 (2019).

19. Kulikov, V., Guo, S-M., Stone, M.B., Goodman, A., Carpenter, A., **Bathe, M.**, Lempitsky, V., DoGNet: A deep architecture for synapse detection in multiplexed fluorescence images. *PLoS Computational Biology*, 15: e1007012 (2019).

20. Jun, H., Zhang, F., Shepherd, T., Ratalanert, S., Qi, X., Yan, H., **Bathe, M.** Autonomously designed free-form 2D DNA origami. *Science Advances*, 5: eaav0655 (2019).

21. Jun, H., Shepherd, T.R., Zhang, K., Bricker, W.P., Li, S., Chiu, W., **Bathe, M.** Automated sequence design of 3D polyhedral wireframe DNA origami with honeycomb edges. *ACS Nano*, 13: 2083 (2019).

22. **Bathe, M.**, Chrisey, L.A., Herr, D.J., Lin, Q., Rasic, D., Woolley, A.T., Zadegan, R., Zhirnov, V.V. Roadmap on biological pathways for electronic nanofabrication and materials. *Nano Futures*, 3: 012001 (2019).

23. Holec, P.V., Berleant, J., **Bathe, M.**, Birnbaum, M.E. A Bayesian framework for high-throughput T cell receptor pairing. *Bioinformatics*, 149: 024905 (2018).

24. Bricker, W.P., Banal, J.L., Stone, M.B., **Bathe, M.** Molecular model of J-aggregated pseudoisocyanine fibers. *The Journal of Chemical Physics*, 149: 024905 (2018).

25. Guo, S-M., Li, L., Veneziano, R., Gordonov, S., Cottrell, J.C., **Bathe, M.** Multiplexed imaging of neuronal synapses using nucleic acid probe exchange. *Protocol Exchange*, doi:10.1038/protex.2018.066 (2018).

26. Veneziano, R., Shepherd, T., Ratanalert, S., Tao, C., **Bathe, M.** *In vitro* synthesis of gene-length single-stranded DNA. *Scientific Reports*, 8: 6548 (2018).

27. Boulais, E., Sawaya, N., Veneziano, R., Andreoni, A., Banal, J.L., Kondo, T., Mandal, S., Lin, S., Schlau-Cohen, G.S., Woodbury, N., Yan, H., Aspuru-Guzik, A., **Bathe, M.** Programmed coherent coupling in a synthetic DNA-based excitonic circuit. *Nature Materials*, 17: 159 (2018).

28. **Bathe, M.** and Rothemund, P. DNA Nanotechnology: A foundation for programmable nanoscale materials. *MRS Bulletin*, doi: 10.1557/mrs.2017.279 (2017).

29. Banal, J.L., Kondo, T., Veneziano, R., **Bathe, M.**, Schlau-Cohen, G.S. Photophysics of J-aggregate-mediated energy transfer on DNA. *The Journal of Physical Chemistry Letters*, doi: 10.1021/acs.jpclett.7b01898 (2017).

30. Cunningham, P., Bricker, W., Diaz, S., Medintz, I., **Bathe, M.**, and Melinger, J.S. Optical determination of the electronic coupling and intercalation geometry of Thiazole Orange homodimer in DNA. *The Journal of Chemical Physics*, 147: 055101 (2017).

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31. Pan, K., Bricker, W., Ratanalert, S., **Bathe, M.** Structure and conformational dynamics of scaffolded DNA origami nanoparticles. *Nucleic Acids Research* 45: 6284 (2017).

32. Guo, S-M., Veneziano, R., Gordonov, S., Li, L., Park, D., Kulesa, A.B., Blainey, P.C., Cottrell, J.R., Boyden, E.S., **Bathe, M.** Multiplexed confocal and super-resolution fluorescence imaging of cytoskeletal and neuronal synapse proteins. *bioRxiv*, doi: 10.1101/111625 (2017).

33. Su, K.C., Barry, Z., Schweizer, N., Maiato, H., **Bathe, M.**, Cheeseman, I. A regulatory switch alters chromosome motions at the metaphase to anaphase transition. *Cell Reports*, 17: 728 (2016).

34. Veneziano, R., Ratanalert, S., Zhang, K., Zhang, F., Yan, H., Chiu, W., **Bathe, M.** Designer nanoscale DNA assemblies programmed from the top down. *Science*, 352: 1534 (2016).

35. Wang, P., Gaitanaros, S., Lee, S., **Bathe, M.**, Shih, W.M., Ke, Y. Programming Self-Assembly of DNA Origami Honeycomb Lattices and Plasmonic Metamaterials. *JACS*, 138: 7733 (2016).

36. Katz, Z.B., English, B.P., Lionnet, T., Yoon, Y.J., Monnier, N., Ovryn, B., **Bathe, M.**, Singer, R.H. Mapping translation 'hot-spots' in live cells by tracking single molecules of mRNA and ribosomes. *eLife*, e10415 (2016).

37. Dhakal, S., Adendorff, M., Liu, M., Yan, H., **Bathe, M.**, Walter, N. Rational design of DNA-actuated enzyme nanoreactors guided by single molecule analysis. *Nanoscale*, 8: 3125 (2016).

38. Hogstrom, L., Guo, S.M., Murugadoss, K., **Bathe, M.** Advancing multiscale structural mapping of the brain through fluorescence imaging and analysis across length-scales. *Journal of The Royal Society Interface*, 6: 20150081 (2016).

39. Gordonov, S., Hwang, M.K., Wells, A., Gertler, F.B., Lauffenburger, D., **Bathe, M.** Time-series modeling of live-cell shape dynamics for image-based phenotypic profiling. *Integrative Biology*, 8: 73 (2016).

40. Sedeh, R., Pan, K., Adendorff, M., Hallatschek, O., Bathe, K.J., **Bathe, M.** Computing nonequilibrium conformational dynamics of structured nucleic acid assemblies. *Journal of Chemical Theory & Computation*, 12: 261 (2016).

41. Monnier, N., Barry, Z., Park, H.Y., Su, K.C., Katz, Z., English, B., Dey, A., Pan, K., Cheeseman, I., Singer, R., **Bathe, M.** Inferring transient particle transport dynamics in live cells. *Nature Methods*, 12: 838 (2015)

42. Sun, G., Guo, S.M., Teh, C., Korzh, V., **Bathe, M.**, Wohland, T. Bayesian model selection applied to the analysis of FCS data of fluorescent proteins in vitro and in vivo. *Analytical Chemistry,* 87: 4326 (2015).

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43. Zhou, Z., Munteanu, E.L., He, J., Ursell, T., **Bathe, M.**, Huang, K.C., Chang, F. The contractile ring coordinates curvature dependent septum assembly during fission yeast cytokinesis. *Molecular Biology of the Cell*, 26: 78 (2015).

44. Pan, K., Kim, D.N., Zhang, F., Adendorff, M., Yan, H., **Bathe, M.** Lattice-free prediction of three-dimensional structure of programmed DNA assemblies. *Nature Communications*, 5: 5578 (2014).

45. Klingner, C., Cherian, A.V., Diesinger, P.M., Aufschnaiter, R., Maghelli, N., Keil, T., Beck, G., Tolic-Norrelykke, I., **Bathe, M.**, and Wedlich-Soldner, R. An isotropic acto-myosin network promotes organization of the apical cell cortex in epithelial cells. *The Journal of Cell Biology*, 207: 107-121 (2014).

46. Sun, W., Boulais, E., Hakobyan, Y., Wang, W., Guan, A., **Bathe, M.**, Yin, P. Casting inorganic structures with DNA molds. *Science* 346: 717 (2014).

47. Mori, M., Somogyi, K., Kondo, H., Monnier, N., Falk, H., Machado, P., **Bathe, M.**, Nedelec, F., and Lenart, P. An Arp2/3 nucleated F-actin shell fragments nuclear membranes at nuclear envelope breakdown. *Current Biology*, 24: 1421-1428 (2014).

48. Oh, H.S., Bryant, K.F., Nieland, T., Mazumder, A., Bagul, M., **Bathe, M.**, Root, D.E. and Knipe, D.M. Targeted RNAi screen reveals novel epigenetic factors that regulate herpesviral gene expression in U2OS osteosarcoma cells. *mBio*, 5: e01086-13 (2014).

49. Guo, S.M., Bag, N., Mishra, A., Wohland, T., **Bathe, M.** Bayesian total internal reflection fluorescence correlation spectroscopy reveals hIAPP-induced plasma membrane domain organization in live cells. *Biophysical Journal*, 106: 190-200 (2014).

50. Pan, K., Boulais, E., Yang, L., **Bathe, M.** Structure-based model for light-harvesting properties of nucleic acid nanostructures. *Nucleic Acids Research*, doi: 10.1093/nar/gkt1269 (2013).

51. Mazumder, A., Pesudo, L.Q., McRee, S., **Bathe, M.**, Samson, L. Genome-wide single-cell-level screen for protein abundance and localization changes in response to DNA damage in *S. cerevisiae*. *Nucleic Acids Research*, 41: 9310-9324 (2013).

52. Subramanian, V., Mazumder, A., Surface, L.E., Butty, V., Fields, P.A., Alwan, A., Torrey, L., Thai, K.K., Levine, S., **Bathe, M.**, Boyer, L. H2A.Z acidic patch couples chromatin dynamics to regulation of developmental gene expression programs during lineage commitment. *PLoS Genetics*, 9: e1003725 (2013).

53. Johnson-Buck, A., Nangreave, J., Kim, D.N., **Bathe, M.**, Yan, H., Walter, N. Super-resolution fingerprinting detects chemical reactions and idiosyncrasies of single DNA pegboards. *Nano Letters*, 13: 728–733 (2013).

54. Mazumder, A., Tummler, K., **Bathe, M.**, Samson, L. Single-cell analysis of RNR transcriptional and translational response to DNA damage. *Molecular & Cellular Biology*, 33: 635–642 (2013).

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55. Krishnan, Y. and **Bathe, M.** Designer nucleic acids to probe and program the cell. *Trends in Cell Biology*, 22: 624–633 (2012).

56. Schmidt, J.C., Haribabu, A., Boeszoermenyi, A., Dashkevich, N.M., Wilson-Kubalek, E., Monnier, N., Markus, M., Oberer, M., Milligan, R., **Bathe, M**., Wagner, G., Grishchuk, E. L., Cheeseman, I.M. The kinetochore-bound Ska1 complex tracks depolymerizing microtubules by binding to curved protofilaments. *Developmental Cell*, 23: 968–980 (2012).

57. Monnier, N., Guo, S.M., Mori, M., He, J., Lenart, P., **Bathe, M**. Bayesian approach to MSD-based analysis of particle motion in live cells. *Biophysical Journal*, 103: 616–626 (2012).

58. Guo, S.M., He, J., Monnier, N., Sun, G., Wohland, T., **Bathe, M**. Bayesian approach to the analysis of fluorescence correlation spectroscopy data II: Application to simulated and in vitro data. *Analytical Chemistry*, 84: 3880–3888 (2012).

59. He, J., Guo, S.M., **Bathe, M**. Bayesian approach to the analysis of fluorescence correlation spectroscopy data I: Theory. *Analytical Chemistry*, 84: 3871–3879 (2012).

60. D.N. Kim, Kilchherr, F., Dietz, H., **Bathe M.** Quantitative prediction of 3D solution shape and flexibility of nucleic acid nanostructures. *Nucleic Acids Research*, 40: 2862–2868 (2012).

61. M. Mori, Monnier, N., Daigle, N., **Bathe, M**., Ellenberg, J., Lenart, P. Intracellular transport by an anchored homogeneously contracting F-actin meshwork. *Current Biology*, 21: 606–611 (2011).

62. Castro, C.E., Kilchherr, F., Kim, D.N., Lin Shiao, E., Wauer, T., Wortmann, P., **Bathe, M**., Dietz, H. A primer to scaffolded DNA origami. *Nature Methods*, 8: 221–229 (2011).

63. Kim, D.N., Altschuler, J., Strong, C., McGill, G., **Bathe, M**. Conformational Dynamics Data Bank (CDDB): a database for conformational dynamics of proteins and supramolecular protein assemblies. *Nucleic Acids Research*, 39: D451–455 (2011).

64. Kim, D.N., Nguyen, C.T., **Bathe, M**. Conformational dynamics of supramolecular protein assemblies. *Journal of Structural Biology*, 173: 261–270 (2011).

65. Strehle, D., Schnauss, J., Heussinger, C., Alvarado, J., **Bathe, M**., Kaes, J., Gentry, B. Transiently crosslinked F-actin bundles. *European Biophysical Journal*, 40: 93–101 (2011).

66. Sedeh, R., Fedorov, A.A., Fedorov, E.V., Ono, S., Matsumura, F., Karplus, M., Almo, S.C., **Bathe, M**. Structure, evolutionary conservation, and conformational dynamics of human fascin-1, an F-actin-crosslinking protein. *Journal of Molecular Biology*, 400: 589–604 (2010).

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67. **Bathe, M**., Chang, F. Cytokinesis and the contractile ring in fission yeast: towards a systems-level understanding. *Trends in Microbiology*, 18: 38–45 (2010).

68. Sedeh, R., **Bathe, M**., Bathe, K.J. The subspace iteration method in protein normal mode analysis. *Journal of Computational Chemistry*, 31: 66–74 (2010).

69. **Bathe, M**., Heussinger, C., Claessens, M.M.A.E., Bausch, A.R., and Frey, E. Cytoskeletal bundle mechanics. *Biophysical Journal*, 94: 2955–2964 (2008).

70. **Bathe, M**. A Finite element framework for computation of protein normal modes and mechanical response. *Proteins: Structure, Function, and Bioinformatics*, 70: 1595–1609 (2008).

71. Heussinger, C., **Bathe, M**., and Frey, E. Statistical mechanics of wormlike bundles. *Physical Review Letters*: 99: Art. No. 048101 (2007).

72. Claessens, M.M.A.E., **Bathe, M**., Frey, E., and Bausch, A.R. Actin-binding proteins sensitively mediate F-actin bundle stiffness. *Nature Materials*, 5: 748–753 (2006).

73. **Bathe, M**., Rutledge, G.C., Grodzinsky, A.J., and Tidor, B. Osmotic pressure of aqueous chondroitin sulfate solution: A molecular modeling investigation. *Biophysical Journal*, 89: 2357–2371 (2005).

74. **Bathe, M**., Rutledge, G.C., Grodzinsky, A.J., and Tidor, B. A coarse-grained molecular model for glycosaminoglycans: Application to chondroitin, chondroitin sulfate, and hyaluronic acid. *Biophysical Journal*, 88: 3870–3887 (2005).

75. **Bathe, M**., Grodzinsky, A.J., Tidor, B., and Rutledge, G.C. Optimal linearized Poisson–Boltzmann theory applied to the simulation of flexible polyelectrolytes in solution. *Journal of Chemical Physics*, 121: 7557–7561 (2004).

76. Kaazempur-Mofrad, M.R., **Bathe, M**., Karcher, H., Younis, H.F., Seong, H.C., Shim, E.B., Chan, R.C., Hinton, D.P., Isasi, A.G., Upadhyaya, A., Powers, M.J., Griffith, L.G., and Kamm, R.D. Role of simulation in understanding biological systems. *Computers & Structures*, 81: 715–726 (2003).

77. **Bathe, M**. and Rutledge, G.C. Inverse Monte Carlo procedure for conformation determination of macromolecules. *Journal of Computational Chemistry*, 24: 876–890 (2003).

78. **Bathe, M**., Shirai, A., Doerschuk, C.M., and Kamm, R.D. Neutrophil transit times through pulmonary capillaries: The effects of capillary geometry and fMLP-stimulation. *Biophysical Journal*, 83: 1917–1933 (2002).

79. **Bathe, M.** and Kamm, R.D. A fluid-structure interaction finite element analysis of pulsatile blood flow through a compliant stenotic artery. *Journal of Biomechanical Engineering*, 121: 361–369 (1999).

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Patents

1. Zhang, F., Shepherd, T.R., Veneziano, R., **Bathe, M.**, Nucleic acid assemblies for use in targeted delivery. U.S. Patent No. 62/727,959, filed Sep. 6, 2018.

2. **Bathe, M.**, Veneziano, R., Moyer, T., Irvine, D. Nucleic acid nanostructure platform for antigen presentation and vaccine formulations formed therefrom. U.S. Patent No. 62/796,472, filed Jan. 24, 2019.

3. Shepherd, T., Du, R., **Bathe, M.** Microbial production of pure single stranded nucleic acids. U.S. Patent No. US10940171B2, filed Nov. 19, 2017, and published March 9, 2021.

4. Banal, J., Berleant, J.D., Shepherd, T., **Bathe, M.** Automated methods for scalable, parallelized enzymatic biopolymer synthesis and modification using microfluidic devices. U.S. Patent Pending US20180362969A1, filed Jun. 19, 2018, and published Dec. 20, 2018.

5. Veneziano, R., Ratanalert, S., Shepherd, T., Jun, H., **Bathe, M.** Stable nanoscale nucleic acid assemblies and methods thereof. International Patent Pending WO2017189870A1, filed Apr. 27, 2017, and published Nov. 2, 2017.

6. **Bathe, M.**, Ratanalert, S., Veneziano, R., Banal, J., Shepherd, T. Sequence-controlled polymer random access memory storage. International Patent Pending WO2017189914A1, filed Apr. 27, 2017, and published Nov. 2, 2017.

7. **Bathe, M.**, Pan, K., Kim, D.-H. Techniques for controlling spatial structure of nucleic acid structures based on lattice-free, three-dimensional junction coordinates. U.S. Patent Pending US20160103951A1, filed Oct. 3, 2015, and published Apr. 14, 2016.

8. **Bathe, M.**, Kim, D.-N., Dietz, H. 2012. Method and apparatus for controlling properties of nucleic acid nanostructures. U.S. Patent US20120166152A1, filed Dec. 22, 2010, and published Jun. 28, 2012.

9. **Bathe, M.**, He, J., Guo, S.-M., Monnier, N. 2012. Bayesian inference of particle motion and dynamics from single particle tracking and fluorescence correlation spectroscopy. U.S. Patent US20120155725A1, filed Dec. 16, 2011, and published Jun. 21, 2012.

Invited Talks and Seminars

1. LBL Molecular Foundry, Virtual Seminar, 2021.

2. SPIE Novel Patterning Technologies, Virtual Seminar, 2021.

3. MIT Biomaking Solutions, Virtual Seminar, 2020.

4. MIT Koch Institute, Virtual Seminar, 2020.

5. MIT Marble Center, Virtual Seminar, 2020.

6. NSF Bioeconomy Distinguished Lecture, Virtual Seminar, 2020.

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7. CROI Boston, Virtual Seminar, 2020.

8. 4th Annual Genome Conference, Virtual Seminar, 2020.

9. Intracellular Dynamics of Molecules: Analysis and Models, Bordeaux, France, 2019.

10. MIT Computational Center for Engineering Symposium, Cambridge, MA, 2019.

11. MIT Research and Development Conference, Accelerating Big Impact Innovations, 2018.

12. Cryo-EM Center at MIT.nano Opening Symposium, Cambridge, MA, 2018.

13. 3rd Annual MIT-Skoltech Conference, Moscow, Russia, 2018.

14. 256th ACS National Meeting, Boston, MA, 2018.

15. Department of Pharmaceutical Sciences, Northeastern University, Boston, MA, 2017.

16. Micron School of Materials Science and Engineering, Boise State University, Boise, ID, 2017.

17. Department of Chemical & Biomolecular Engineering, Vanderbilt University, Nashville, TN, 2017.

18. KoreaBIO, Seoul, South Korea, 2017.

19. Applied Math and Computational Science, University of Pennsylvania, Philadelphia, PA, 2017.

20. 72nd New England Complex Fluids Workshop, Brandeis University, Newton, MA, 2017.

21. First Conference on Biomotors, Virus Assembly, and Nanobiotechnology Applications, Ohio State University, Columbus, OH, 2017.

22. Department of Chemistry & Biochemistry, Georgia Institute of Technology, Atlanta, Georgia, 2017.

23. DNATEC, Dresden, Germany, 2017.

24. HYBER Symposium, Helsinki, Finland, 2017.

25. The Future of Integrative Structural Biology Workshop, Clemson University, Clemson, SC, 2017.

26. Frontiers in Imaging Science Workshop, Janelia Research Campus, Ashburn, VA, 2017.

27. Department of Chemistry, Carnegie Mellon University, Pittsburgh, PA, 2017.

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28. Non-invasive Delivery of Macromolecules Conference, San Diego, CA, 2017.
29. Gordon Conference on RNA Nanotechnology, Ventura Beach, CA, 2017.
30. Frederick National Laboratory for Cancer Research, Frederick, MD, 2016.
31. SRC/IBM/ONR Workshop on Biological Pathways for Electronic Nanofabrication and Materials, San Jose, CA, 2016.
32. High Content Analysis and 3D Screening Conference, Boston, MA, 2016.
33. Allen Institute for Cell Science in Seattle, WA, 2016.
34. Department of Biology, Boston College, Chestnut Hill, MA, 2016.
35. American Chemical Society Annual Meeting, Philadelphia, PA, 2016.
36. Conference on Excited State Processes, Santa Fe, New Mexico, 2016.
37. U.S. Naval Research Laboratory, Washington, D.C., 2016.
38. Ten Years of DNA Origami Symposium, Caltech, Pasadena, CA, 2016.
39. Modeling and Inference Workshop: From Single Molecules to Cells, Ohio State University, Columbus, OH, 2016.
40. Biozentrum at the University of Basel, Basel, Switzerland, 2015.
41. Department of Chemistry, University of Chicago, Chicago, IL, 2015.
42. Department of Chemistry, University of Michigan, Ann Arbor, MI, 2015.
43. Autodesk Research, Inc., San Francisco, CA, 2015.
44. Department of Biological Engineering, MIT, Cambridge, MA, 2015.
45. DNA21, Harvard University, Cambridge, MA, 2015.
46. Washington University, St. Louis, MO, 2015.
47. Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN, 2015.
48. 14th European Conference on Computational Biology in Strasbourg, France, 2014.
49. Department of Cell & Molecular Biology, Uppsala University, Uppsala, Sweden, 2014.
50. Microscopy Graduate Workshop at Stowers Institute for Medical Research in Kansas City, MO, 2014.

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51. 110th International Titisee Conference, Titisee, Germany, 2014.

52. Department of Physics, McGill University, Montreal, Canada, 2014.

53. SIAM Conference on the Life Sciences, Charlotte, NC, 2014.

54. World Congress of Biomechanics, Boston, MA, 2014.

55. World Congress of Biomechanics, Boston, MA, 2014.

56. Curie Institute, Paris, France, 2014.

57. DNATEC14, Dresden, Germany, 2014.

58. Foundations of NanoScience Conference, Snowbird, UT, 2014.

59. GPU Technology Conference, San Jose, CA, 2014.

60. National Academy of Sciences Kavli Frontiers of Science & Engineering Symposium, Rio de Janeiro, Brazil, 2014.

61. Department of Biochemistry & Molecular Biology at Wayne State University School of Medicine, Detroit, MI, 2014.

62. Quantitative Bioimaging Conference at the University of New Mexico, Albuquerque, NM, 2014.

63. Physical Mathematics Seminar Series, MIT, Cambridge, MA, 2013.

64. Department of Physics, University of Maryland, College Park, MD, 2013.

65. Interdisciplinary Symposium on Advanced Nano/Biosystems: Design, Fabrication, and Characterization, University of Illinois at Urbana-Champaign, Champaign, IL, 2013.

66. Department of Chemistry and Biochemistry, Arizona State University, Phoenix, AZ, 2013.

67. National Centre for Biological Sciences TIFR, Bangalore, India, 2013.

68. Janelia Farm Research Campus, Ashburn, VA, 2013.

69. Department of Physics, Technical University of Munich, Munich, Germany, 2013.

70. International Workshop on Macromolecular Structure and Dynamics, Uppsala University, Uppsala, Sweden, 2013.

71. SciLifeLab, The Svedberg Seminar Series, Uppsala University, Uppsala, Sweden, 2013.

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72. Department of Biochemistry and Molecular Biology, University of Chicago, Chicago, IL, 2013.

73. 57th Annual Biophysical Society Meeting, Philadelphia, PA, 2013.

74. Boston University, Integrative Systems Biology Seminar Series, Boston, MA, 2012.

75. Materials Research Society, Boston, MA, 2012.

76. NNIN/C Conference, Synergy Between Experiment and Computation in Energy – Looking to 2030, Harvard University, Cambridge, MA, 2012.

77. Ohio State University, Columbus, OH, 2012.

78. Soft Matter Approaches to Biological Physics, KITP UCSB, Santa Barbara, CA, 2011.

79. Foundations of Nanoscience, Snowbird, UT, 2011.

80. Biophysical Society, Baltimore, MD, 2011.

81. Biophysical Society, Baltimore, MD, 2011.

82. EMBO Workshop on Modeling, Microscopy, and Biophysical Methods, EMBL Heidelberg, Heidelberg, Germany, 2010.

83. Department of Biochemistry-Biophysics, Brandeis University, Waltham, MA, 2010.

84. The Cellular Cytoskeleton, Pingree Park, CO, 2010.

85. Harvard Squishy Physics, Harvard University, Cambridge, MA, 2010.

86. MIT Graduate Student Council Alumni Speaker Series, Cambridge, MA, 2009.

87. MIT BMES Undergraduate Students Association, Cambridge, MA, 2009.

88. Annual Meeting of the United States Association for Computational Mechanics, Columbus, OH, 2009.

89. Annual Meeting of the Biophysical Society, Boston, MA, 2009.

90. WAM Seminar Series, Harvard University, Cambridge, MA, 2009.

91. Institute for Biomolecular Science, Gakushuin University, Tokyo, Japan, 2009.

92. 2009 MIT in Japan Conference, Tokyo, Japan, 2009.

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Workshops

1. Co-Organizer, SRC/IBM/ONR Workshop on Biological Pathways for Electronic Nanofabrication and Materials in San Jose, CA, 2016.

2. Participant, Army Research Office Workshop on Bioenabled Materials Synthesis & Assembly, Army Research Laboratory, Fort Detrick, MD, 2016.

3. Participant, IARPA/SRC Workshop on DNA-based Massive Information Storage, Arlington, VA, 2016.

4. Participant, DARPA, From One, Many: Engineered Multi-cellularity, Arlington, VA, 2015.

5. Participant, DoD Future Directions in Chemical and Biological Engineering, UT Austin, Austin, TX, 2013.

6. Organizer, Collective Behavior in Biological Systems, MIT, Cambridge, MA, 2013.

7. Instructor, Quantitative Biology Workshop, MIT, Cambridge, MA, 2013.

8. Organizer, MacroMoleculeBuilder Workshop, MIT, Cambridge, MA, 2012.

9. Instructor, Quantitative Biology Workshop, MIT, Cambridge, MA, 2012.

10. Participant, National Academies Keck Workshop on Frontiers in Imaging Science, National Academy of Sciences & Engineering, Irvine, CA, 2010.

11. Instructor, EMBO Workshop on Modeling, Microscopy, and Biophysical Methods, EMBL Heidelberg, Heidelberg, Germany, 2010.

Archival Journal Referee

Accounts of Chemical Research
ACS Nano
Analytical Chemistry
Angewandte Chemie
Biophysical Journal
Biopolymers
Cell
Chemical Reviews
E-life
European Physical Journal
Integrative Biology
Journal of the American Chemical Society
Journal of Biological Chemistry
Journal of Cell Biology
Journal of Cell Science
Journal of Chemical Information and Modeling
Journal of Chemical Physics

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Journal of Computational Chemistry
Journal of Computational and Theoretical Nanoscience
Journal of Visualized Experiments
Nano Letters
Nanoscale
Nature Communications
Nature Methods
Nature Nanotechnology
Nucleic Acids Research
Physical Biology
Physical Review E
PLoS Computational Biology
PLoS ONE
PNAS
Science

Teaching

Term	Course Number	Course Title	Role	Course Type
Spring 2021	20.310	Molecular, Cell, and Tissue Biomechanics	Lecturer	Lecture
Fall 2020	20.430	Fields, Forces, & Flows in Biological Systems	Lecturer	Lecture
Spring 2020	20.310	Molecular, Cell, and Tissue Biomechanics	Lecturer	Lecture
Spring 2019	20.310	Molecular, Cell, and Tissue Biomechanics	Lecturer	Lecture
Fall 2017	20.430	Fields, Forces, & Flows in Biological Systems	Lecturer	Lecture
Fall 2017	20.310	Molecular, Cell, and Tissue Biomechanics	Lecturer	Lecture
Spring 2017	20.315/20.415	Physical Biology	Lecturer	Lecture
Fall 2016	20.430	Fields, Forces, & Flows in Biological Systems	Lecturer	Lecture

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Spring 2016	20.310	Molecular, Cell, and Tissue Biomechanics	Lecturer	Lecture
Fall 2015	20.430	Fields, Forces, & Flows in Biological Systems	Lecturer	Lecture
Fall 2015	20.416	Topics in Biophysics & Physical Biology	Lecturer	Lecture
Spring 2015	20.415	Physical Biology	Lecturer	Lecture
Fall 2014	20.430	Fields, Forces, & Flows in Biological Systems	Lecturer	Lecture
Fall 2014	20.416	Topics in Biophysics & Physical Biology	Lecturer	Lecture
Spring 2014	20.415	Physical Biology	Lecturer	Lecture
Fall 2013	20.416	Topics in Biophysics & Physical Biology	Lecturer	Lecture
Spring 2013	20.416	Topics in Biophysics & Physical Biology	Lecturer	Lecture
Spring 2013	20.415	Physical Biology	Lecturer	Lecture
Fall 2013	20.430	Fields, Forces, & Flows in Biological Systems	Lecturer	Lecture
Fall 2012	CSB.100	Topics in Computational & Systems Biology	Lecturer	Lecture
Fall 2012	20.416	Current Research in Biophysics	Lecturer	Lecture
Fall 2012	20.430	Fields, Forces, & Flows in Biological Systems	Lecturer	Lecture
Spring 2012	20.415	Physical Biology	Lecturer	Lecture
Fall 2011	20.110	Thermodynamics of Biomolecular Systems	Lecturer	Lecture

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Fall 2011	20.416	Current Research in Biophysics	Lecturer	Lecture
Fall 2010	20.430	Fields, Forces, & Flows in Biological Systems	Lecturer	Lecture
Spring 2010	20.415	Physical Biology	Lecturer	Lecture
Fall 2009	20.110	Thermodynamics of Biomolecular Systems	Lecturer	Lecture
Spring 2009	20.410	Molecular, Cell, and Tissue Biomechanics	Lecturer	Lecture

Current Graduate Students

Name	**Prior University**	**Training Period**	**Project Area**	**Current Position**
Matthew Allan	Penn State University	2018–present	RNA nanotechnology	Graduate Student
Joseph Berleant	California Institute of Technology	2017–present	DNA nanotechnology	Graduate Student
Rebecca Du	California Institute of Technology	2017–present	DNA nanotechnology	Graduate Student
Beny (Reuven) Falkovich	Technion University	2020–present	Neuronal imaging	Graduate Student
Andy (Hyun-Min) Kim	Caltech	2019–present	DNA nanotechnology	Graduate Student
Grant Knappe	University of Maryland	2020–present	DNA nanotechnology	Graduate Student
Molly Parsons	Iowa State University	2017–present	RNA nanotechnology	Graduate Student
Anna Romanov	Georgia Tech	2020–present	DNA nanotechnology	Graduate Student
Kristin Sheridan	MIT	2020–present	DNA nanotechnology	Graduate Student
Julia Wu	MIT	2020–present	Neuronal data analysis	Graduate Student

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Past Graduate Students

Name	Prior University	Training Period	Project Area	Current Position
Matthew Adendorff	Rhodes University	2011–2015	Computing free energy landscapes of DNA immobile four-way junctions	Lead Technologist, Open Data Durban
Zachary Barry	Georgia Institute of Technology	2012–2017	Bayesian analysis of peptidoglycan synthesis	Investigator, Novartis Institutes for Biomedical Research, Inc.
Philip Bransford	University of Minnesota	2009–2011	Dynamics and evolution of cadherins and actin-bundling proteins	Senior Scientist, Vertex Pharmaceuticals, Inc.
Simon Gordonov	Rutgers University (B.Sc.); Cambridge University (M.Phil.)	2012–present	Analysis & modeling of cell migration	Scientist, Vertex Pharmaceuticals, Inc.
Syuan-Ming Guo	National Taiwan University	2009–2016	Bayesian inference and super-resolution imaging of membrane dynamics	Imaging Data Scientist, Chan-Zuckerberg BioHub
Nilah Monnier Ioannidis	Harvard University (B.A.); University of Cambridge (M.Phil.)	2009–2012	Bayesian inference approaches for particle trajectory analysis in cell biology	Assistant Professor, University of California Berkeley
Sakul Ratanalert	Cornell University	2013–2018	Structural DNA nanotechnology	Lecturer, Johns Hopkins University
Reza Sedeh	Tehran University	2009–2012	Contributions to the analysis of proteins	Senior Data Scientist, Microsoft, Inc.

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Current Postdoctoral Research Associates

Name	Doctoral University	Training Period	Project Area	Current Position
James Banal	University of Melbourne	2016–present	Programmable excitonic systems on DNA nanostructures	Postdoctoral Associate
Chi Chen	University of Paris Sud	2020–present	DNA-based computing materials	Postdoctoral Associate
Floris Engelhardt	TU Munich	2020–present	Single-stranded DNA design and production	Postdoctoral Associate
Jeffrey Gorman	University of Cambridge	2020–present	Biomimetic light-harvesting materials	Postdoctoral Associate
Torsten John	Leipzig University	2020–present	DNA data storage materials	Postdoctoral Fellow
Eike Wamhoff	Max Planck Institute of Colloids and Interfaces	2017–present	DNA nanotechnology vaccines and therapeutic delivery	Postdoctoral Fellow
Xiao Wang	New York University	2018–present	Structural DNA nanotechnology	Postdoctoral Associate

Former Postdoctoral Research Associates

Name	Doctoral University	Training Period	Project Area	Current Position
Etienne Boulais	École Polytechnique de Montréal	2013–2015	Excitonic properties of DNA-dye assemblies	Research Scientist, MDA, Inc.
William Bricker	Washington University	2015–2019	Computational modeling of DNA-based excitonic assemblies	Assistant Professor, University of New Mexico
Philipp Diesinger	Institute of Theoretical Physics, University of Heidelberg	2010–2011	Quantitative analysis of cytoskeletal dynamics	Head of Global Data Science, Boehringer Ingelheim, Inc.
Changsun Eun	University of California San Diego (Postdoc) - University of North	2014–2014	DNA scaffolded multi-enzyme cascades	Research Scientist, LG Chemicals, Inc.

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	Carolina at Chapel Hill (Ph.D.)			
Stavros Gaitanaros	University of Texas at Austin	2014–2015	DNA nanostructure solution shape and mechanics	Assistant Professor, Johns Hopkins University
Syuan-Ming Guo	National Taiwan University	2016–2018	Bayesian inference and super-resolution imaging of membrane dynamics	Imaging Data Scientist, Chan-Zuckerberg BioHub
Yera Hakobyan	Cornell University	2013–2014	Structure-based mechanical modeling of DNA origami	Data Science Architect, 3M
Jun He	Brown University	2009–2011	Bayesian approach to imaging-based spectroscopy	Data Science Manager, Adobe, Inc.
Hyungmin Jun	Korea Advanced Institute of Science and Technology	2015–2019	Structural DNA nanotechnology	Assistant Professor, Jeonbuk National University
Do-Nyun Kim	MIT	2011–2014	Predicting 3D structure of DNA origami	Associate Professor, Seoul National University
Aprotim Mazumder	NCBS – TIFR Bangalore, India	2009–2014	Single-cell DNA Damage Response	Assistant Professor, TCIS, TIFR
Keyao Pan	Rice University	2011–2016	DNA nanostructure solution shape prediction	Data Scientist, Facebook, Inc.
Pramod Pisharady	National University of Singapore	2013–2014	Bayesian reconstruction of structural MRI data	Research Associate, University of Minnesota
Tyson Shepherd	University of Iowa	2015–2018	RNA nanostructures	Research Associate, MIT
Mathew Stone	University of Michigan	2017–2018	Quantitative fluorescence imaging of neurons and B-cells	Associate Predictive Modeler, Auto-Owners Insurance
Martin Tomov	Colleges of Nanoscale	2016–2018	Multiplexed fluorescence imaging	Postdoctoral Fellow, Emory

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	Science and Engineering, SUNY Polytechnic Institute / University at Albany-SUNY		of stem cell-derived neurons	University
Remi Veneziano	Institute Charles Gerhardt	2014–2018	Membrane-associated biomolecular structure and dynamics	Assistant Professor, George Mason University
Jessica Wu	University of California, Irvine, Irvine, CA	2016–2016	Phenotypic profiling of synaptic proteins and mRNAs	Senior Scientist, AbbVie, Inc.
Lun Yang	Carnegie Mellon University	2012–2013	Modeling nanoscale excitonic networks	Quantitative Research Developer, GMO

Doctoral Thesis Committee Reader

2009 BoBae Lee (DMSE), Thesis Committee Member
2011 Ishan Barman (ME), Thesis Committee Member
2011 Fei Liang (BE), Thesis Committee Member
2013 Sungmin Son (ME), Thesis Committee Member
2013 Dimitrios Tzeranis (ME), Thesis Committee Member
2013 Dhiraj Devidas Bhatia (NCBS), Thesis Committee Member
2014 Christopher Negron (CSB), Thesis Committee Member
2015 Thomas Gurry (CSB), Thesis Committee Member
2015 Chia-Ching Chou (CEE), Thesis Committee Member
2015 Joyce Yang (HMS), Thesis Committee Member
2016 William Hesse (BE), Thesis Committee Chair
2016 Kelly Brock (CSB), Thesis Committee Member
2016 Rotem Gura (CSB), Thesis Committee Member
2016 Kento Masayuma (AA), Thesis Committee Member
2017 Eric Ma (BE), Thesis Committee Chair
2018 Anthony Kulesa (BE), Thesis Committee Chair
2018 Stavros Chatzieleeftheriou (NTUA), Thesis Committee Member
2019 Alex Wesselhoeft (Biology), Thesis Committee Member
2019 Aaron Dy (BE), Thesis Committee Chair
2019 Paul Reginato (BE), Thesis Committee Chair

Software and Servers

http://cando-dna-origami.org
Automated server to predict 3D solution shape of nucleic acid based nanostructures.

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http://daedalus-dna-origami.org
Automated server to compute DNA sequences needed to fold 3D DNA origami nanoparticles with DX-edges.

http://metis-dna-origami.org
Automated server to compute DNA sequences needed to fold 2D DNA origami objects with honeycomb edges.

http://perdix-dna-origami.org
Automated server to compute DNA sequences needed to fold 2D DNA origami objects with DX-edges.

http://talos-dna-origami.org
Automated server to compute DNA sequences needed to fold 3D DNA origami nanoparticles with honeycomb edges.

http://fcs-bayes.org
Software to perform objective Bayesian analysis of fluorescence correlation spectroscopy data of molecular binding and transport processes from living and non-living chemical systems.

http://hmm-bayes.org
Software to perform Bayesian model selection of the physical mode of motion of single-particles from single-step resolution trajectories measured from time-lapse sequences of particle positions.

http://msd-bayes.org
Software to perform Bayesian model selection of the physical mode of motion of single-particles from mean-square displacement curves measured from time-lapse sequences of particle positions.

http://saphire-hcs.org
Software to perform Bayesian classification of live-cell imaging datasets based on cell shape segmentation and stochastic modeling of transition states using hidden Markov modeling.

Funded Research Grants

MIT CEHS NIH P30-ES002109 **9/1/2010–3/31/2012**
Role: Pilot Project PI $40,991
MIT CEHS NIH P30 EHSCC Pilot Project Program
CEHS Pilot: Single-cell Analysis of Transcriptional and Translational Regulation of Genes Essential for DNA-Damage Response

DOD-MURI W911NF-12-1-0420 **7/1/2012–8/19/2018**
Role: Co-I (PI Yan) $624,750
DOD-ONR
Translating Biochemical Pathways to Non-Cellular Environments

ONR DURIP N00014-13-1-0664 **6/15/2013–6/14/2014**
Role: PI (Equipment Grant) $313,969

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Navy-ONR DURIP
DURIP: High Performance Computing for Nucleic Acids Nanotechnology

NSF DMREF CMMI-1334109 **1/15/2014–12/31/2018**
Role: PI (Total Award) $1,706,468
NSF DMREF (Bathe Portion) $817,106
Computational Design Principles for Functional DNA-based Materials

NSF PoLS PHY-1305537 **4/1/2014–3/31/2018**
Role: PI $540,000
NSF PoLS
Inferring the Physics of Living Systems from Dynamic Light Microscopy Data

HFSP RGP0029/2014 **5/1/2014–4/30/2018**
Role: Co-I (PI Krishnan) $337,500
Human Frontier Science Program
Dissecting the Mechanochemistry of Membrane Invagination with Designer DNA-Based Probes

ONR N00014-12-1-0621 & N00014-14-1-0609 & N00014-16-1-2181 **5/15/2014–8/14/2017**
Role: PI $1,418,207
Navy-ONR
Computer-Aided Engineering for Nucleic Acid-Based Nanotechnology

NIH U01-MH106011 **9/26/2014–11/30/2017**
Role: Co-I (PI Boyden) (Total Award) $2,154,250
NIH BRAIN (Bathe Portion) $714,195
Ultra-Multiplexed Nanoscale In Situ Proteomics for Understanding Synapse Types

Anonymous Foundation **12/29/2014–12/31/2016**
Role: PI (Equipment Grant) $650,000
Anonymous Foundation
Purchase of a Light-sheet Fluorescence Microscope for Advanced Multi-scale Imaging at MIT

DOE-Chicago DE-SC0001088 **8/1/2015–7/31/2018**
Role: Co-I (PI Baldo) (Bathe Portion) $329,893
DOE
RLE-Center for Excitonics

NSF EAGER CCF-1547999 **8/1/2015–7/31/2019**
Role: PI $155,000
NSF EAGER
Algorithmic Design Principles for Programmed DNA Nanocages

ONR DURIP N00014-15-1-2830 **9/29/2015–9/28/2016**
Role: PI (Equipment Grant) $179,676
Navy-ONR DURIP
DURIP: High Performance Computing for Nucleic Acid Nanotechnology

NSF CCF-1564025 **4/1/2016–3/31/2021**

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Role: PI $638,493
NSF
AF: Medium: Collaborative Research: Top-down Algorithmic Design of Structured Nucleic Acid Assemblies

ONR DURIP N00014-16-1-2506 **7/15/2016–8/31/2017**
Role: PI (Equipment Grant) $162,843
Navy-ONR DURIP
DURIP: High-throughput Assembly and Characterization Tools for Structural DNA Nanotechnology

ONR N00014-16-1-2953 **9/1/2016–8/31/2019**
Role: PI (Total Award) $786,856
Navy-ONR (Bathe Portion) $561,856
DNA Origami Scaffolds for Single-particle Cryo-Electron Microscopy of Viral RNA

Skoltech 1911/R **12/1/2016–11/30/2019**
Role: Co-I (PI Lempitsky) (Bathe Portion) $492,945
Skolkovo Institute of Science and Technology
Deep Learning Toolbox for Cell Image Analysis

NIH R01-MH112694 **4/1/2017–2/28/2022**
Role: PI (Total Award) $2,018,175
NIH R01 (Bathe Portion) $1,547,000
Simultaneous Multiplexed in Situ Fluorescence Imaging of Neuronal Proteins and Messenger RNAs

DOE DE-SC0016353 **6/15/2017–6/14/2019**
Role: Co-I (PI Yan) (Bathe Portion) $213,388
DOE/Arizona State University
DNA Nanostructure Directed Designer Excitonic Networks

ONR N00014-17-1-2609 **8/1/2017–7/31/2021**
Role: PI $661,663
Navy-ONR
Hierarchical Nanoscale Materials Programmed using Structured DNA Nanoparticles

NSF PHY-1707999 **8/15/2017–7/31/2021**
Role: PI $720,000
NSF PoLS
Inferring the Physics of mRNA Trafficking in Neuronal Systems

MIT Deshpande MOU **9/1/2017–2/15/2019**
Role: PI $50,000
MIT Deshpande Center
Structured DNA Nanoparticles as a Therapeutic Delivery Platform

NSF CBET-1729397 **1/1/2018–12/31/2021**
Role: PI (Total Award) $1,600,000
NSF DMREF (Bathe Portion) $770,500

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DMREF: Computational Design of Next-generation Nanoscale DNA-based Materials

ONR DURIP N00014-18-1-2290 **6/1/2018–5/31/2019**
Role: PI (Equipment Grant) $364,186
Navy-ONR DURIP
DURIP: DNA Synthesizer for the Development of New Modalities for DNA Nanostructures

NIH R21-EB026008 **8/15/2018–12/20/2021**
Role: PI $796,348
NIH R21
Structured DNA Nanoparticles Therapeutic mRNA and CRISPR/Cas9 Delivery

i-Corps W911NF1810436 **9/10/2018–9/9/2021**
Role: PI $70,000
Army-ARO
Assessment of Nanoparticle Assemblies for Efficient Gene Therapy Vehicles

NSF CHE-1839155 **9/15/2018–8/31/2022**
Role: PI (Total Award) $1,000,000
NSF RAISE (Bathe Portion) $321,772
RAISE-TAQS: Room-Temperature Quantum Sensing and Computation using DNA-based Excitonic Circuits

ARL ICB Subaward KK1954 **12/1/2018–11/30/2019**
Role: Seed PI (PI Lauffenburger) $90,000
UC Santa Barbara/DOD
Programmable DNA-based Meta-materials

ONR DURIP N00014-19-1-2344 **6/1/2019–5/31/2021**
Role: PI (Equipment Grant) $453,000
Navy-ONR DURIP
Combinatorial DNA nanoparticle libraries for structural biology and materials research

DOE DE-SC0019998 **8/1/2019–7/31/2022**
Role: Co-I (PI Schlau-Cohen) $390,000
DOE
Controlling Exciton Dynamics with DNA Origami for Quantum Information Science

NSF HDR OAC-1940231 **10/1/2019–9/30/2021**
Role: PI $334,231
NSF HDR
Collaborative Research: Autonomous Computing Materials

UC Santa Barbara Subaward KK1955 **12/1/2019–11/30/2021**
Role: Co-PI (PI McFarlane) (Total Award) $339,321
DOD UARC (Bathe Portion) $164,385
Controlling Electromagnetic Properties of DNA-based Metamaterials

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MIT ISN Seed Funding W911NF-13-D-0001 **12/1/2019–12/31/2021**
Role: Co-PI (PI Irvine) $95,000
MIT ISN
Pilot Project: Enzyme-Encapsulated Nucleic Acid Vaccines

ONR N00014-20-1-2084 **1/15/2020–1/14/2024**
Role: PI (Total Award) $798,730
Navy-ONR (Bathe Portion) $690,027
Synthetic Nucleic Acid Nanoparticles for RNA Structural & Synthetic Biology

ONR DURIP N00014-20-1-2202 **4/1/2020–3/31/2022**
Role: PI $552,061
Navy-ONR DURIP
DURIP: Expansion of Combinatorial DNA Nanoparticle Libraries for Materials Research & Structural Biology

SPARK Therapeutics, Inc. **3/11/2020–3/10/2022**
Role: PI $54,960
SPARK Therapeutics, Inc.
Evaluation of phagemid-produced single-strand DNA

Fast Grant Award **4/15/2020–4/30/2021**
Role: PI (Total Award) $150,000
Mercatus Center at George Mason University (Bathe Portion) $70,000
COVID-19 Fast Grant

NSF CCF-1956054 **5/1/2020–4/30/2024**
Role: PI $900,000
NSF CCF
AF Medium: DNA-based Data Storage and Computing Materials

ONR N00014-21-1-4013 **11/2/2020–11/1/2023**
Role: PI $711,687
Navy-ONR
Hierarchical Nanoscale Materials Programmed using Structured DNA Nanoparticles