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EDUCATION

Massachusetts Institute of Technology

Ph.D	Department of Mechanical Engineering	2009
Major	Program in Polymer Science and Technology	
Minor	Solid Mechanics	

The Ohio State University

M.S.	Department of Mechanical Engineering	2005
B.S.	Department of Mechanical Engineering	2005

PROFESSIONAL APPOINTMENTS

2009-2011	Alexander von Humboldt Postdoctoral Research Fellow, Technische Universität München
2011-2017	Assistant Professor, Mechanical & Aerospace Eng., The Ohio State University
2011-Present	Faculty Member, Biophysics Graduate Program, The Ohio State University
2017-2020	Associate Professor, Mechanical & Aerospace Eng., The Ohio State University
2020-Present	Professor, Mechanical & Aerospace Eng., The Ohio State University
2020-Present	Program Director, Mechanical Eng., The. Ohio State University

AWARDS & HONORS

Big Ten Academic Leaders Program Fellow	Big Ten Alliance	2022
Harrison Faculty Award for Excellence in Engineering Education	The Ohio State University College of Engineering	2021
American Institute of Medical and Biological Engineering (AIMBE) Fellow	AIMBE	2021
Lumley Interdisciplinary Research Award	The Ohio State University	2020
Fulbright Research Scholar Award	Fulbright Scholars Program	2018
Lumley Research Award	The Ohio State University	2017
People to Know in Science and Technology	Columbus Business First	2016
Kavli Fellow	Kavli Institute	2016
Moran Award for Teaching Excellence	The Ohio State University	2015
NSF Career Award	National Science Foundation	2014
Pi Tau Sigma Above and Beyond Award	Ohio State Chapter of Pi Tau Sigma Mechanical Engineering Honorary	2013

Humboldt Postdoctoral Fellowship	Alexander von Humboldt Foundation	2010-2011
MIT Biomechanics Training Grant	MIT – Biological Engineering	2007-2009
PPST Award for Research Excellence	MIT Program in Polymer Science and Technology	2006
DuPont Presidential Fellowship	MIT – Mechanical Engineering	2005-2006

PUBLICATIONS (https://go.osu.edu/castro_google_scholar)

* indicates co-corresponding author, ** indicates members of Castro Lab, + indicates co-first authors

1. **Wang, Y., Xin, J., Castro, C.E., Accelerating the Characterization of Dynamic DNA Origami Devices with Deep Neural Networks. Under review (preprint on bioRxiv, https://www.biorxiv.org/content/10.1101/2023.05.11.540408v1)
2. **Pfeifer, W.G., **Huang, C.H., Poirier, M.G., *Arya, G., ***Castro, C.E.** Versatile Computer Aided Design of Freeform DNA nanostructures and assemblies. *Science Advances*, Accepted
3. DeLuca, M., **Pfeifer, W.G., **Huang, C.M., Poirier, M.G., **Castro, C.E.**, Arya, G. Thermally Reversible Pattern Formation in Arrays of Molecular Rotors. *Nanoscale,* **15:**8356-8365, https://doi.org/10.1039/D2NR05813H, preprint on bioRxiv https://www.biorxiv.org/content/10.1101/2022.10.19.512893v1
4. **,+Wang, Y., +Sensale, S., **,+Pedrozo, M., Poirier, M.G., *Arya, G., ***Castro, C.E.** Steric Communication between Dynamic Components on DNA nanodevices, *ACS Nano*, in press https://doi.org/10.1021/acsnano.2c12455, preprint on bioRxiv https://www.biorxiv.org/content/10.1101/2022.12.15.520588v1
5. **,+Beshay, P.E., **,+Kucinic, A., Wile, N., **Halley, P.D., **Des Rosiers, L., **Chowdhury, A., Hall, J.L., ***Castro, C.E., ***Hudoba, M.W. Translating DNA origami Nanotechnology to Middle School, High School, and Undergraduate Laboratories. *The Biophysicist*, https://doi.org/10.35459/tbp.2022.000228 (2023), preprint on bioRxiv, https://www.biorxiv.org/content/10.1101/2022.09.15.508130v1
6. +Wang, Y., +Kucinic, A., Des Rosiers, L., Wile, N., *Hudoba, M.W, ***Castro, C.E.** Mechanical Design of DNA Origami in the Classroom. *Applied Sciences*, 13(5): 3208 (2023)
7. **Kucinic, A., **Huang, C.M., **Wang, J., Su, H.J., **Castro, C.E.** DNA origami tubes with reconfigurable cross-sections. *Nanoscale*, 2(15): 562-572 (2022)
8. **Shahhosseini, M., **Beshay, P.E., Akbari, E., Avendano, A., Song, J.W. **Castro, C.E.** Multiplexed detection of cell-molecular interactions with DNA origami engineered cells in 3D collagen matrices. *ACS Applied Materials & Interfaces*, 14(50):55307–55319 (2022), preprint on bioRxiv (https://www.biorxiv.org/content/10.1101/2022.02.04.479158v1)
9. Akbari, E., **Shahhosseini, M., Robbins, A., Poirier, M.G., Song, J.W., **Castro, C.E.** Low-Cost and Massively Parallel Force Spectroscopy with Fluid Loading on-a-chip (FLO-Chip). *Nature Communications*, 13:6800 (2022)
10. Shy, B.R., Vykunta, V.S., Ha, A., Talbot, A., Roth, T.L., Nguyen, D.N., Pfeifer, W.G., Chen, Y.Y., Blaeschke, F., Shifrut, E., Vedova, S., Mamedov, M.R., Chung, J.-Y., Li, H., Wolf, J., Martin, T.G., **Castro, C.E.**, Ye, L., Esensten, J.H., Eyquem, J., Marson, A.* Hybrid ssDNA repair templates enable high yield genome engineering in primary cells for disease modeling and cell therapy manufacturing. *Nature Biotechnology* (2022) (preprint on bioRxiv, https://www.biorxiv.org/content/10.1101/2021.09.02.458799v1)
11. **Lucas, C.R., **Halley, P.D., **Chowdury, A., Lakshmanan, A., Harrington, B. K., Wasmuth, R., Beaver, L., Lapalombella, R., Johnson, A.J., Hertlein, E. K., Byrd, J.C. **Castro, C.E.**, DNA Origami

Nanostructures Elicit Dose-Dependent Immunogenicity and are Non-toxic up to High Doses *in vivo*. *Small*, 18(26): 2108063 (2022)

12. Kaufhold, W.T., **Pfeifer, W., **Castro, C.E.**, Di Michele, L. Probing the mechanical properties of DNA nanostructures with metadynamics. (preprint on arXiv: https://arxiv.org/abs/2110.01477). *ACS Nano*, 16(6): 8784-8797 (2022)
13. Darcy, M., Crocker, K., **Wang, Y., **Le, J., **Mohommadiroozbahani, G., Abdelhamid, M., Craggs, T., **Castro, C.E.**, Bundschuh, R., Poirier, M. High Force Application by a Nanoscale DNA Force Spectrometer. *ACS Nano*, 16(4): 5682-5695 (2022)
14. Lin-Shiao, E., **Pfeifer, W., Shy, B., Saffari Doost, M., Chen, E., Vykunta, V., Hamilton, J., Stahl, ., **Lopez, D., Sandoval Espinoza, C., Dejanov, A., Lew, R., Poirer, M., Marson, A., **Castro, C.E.**, Doudna, J.A. CRISPR-Cas9 mediated nuclear transport and genomic integration of nanostructured genes in human primary cells. *Nucleic Acids Research*, 50(3): 1256-1268 (2022) (preprint on bioRxiv: https://www.biorxiv.org/content/10.1101/2021.11.08.467750v1)
15. Crocker, K., **Johnson, J.A., Pfeifer, W.G., **Castro, C.E.**, Bundschuh, R.A. A quantitative model for a nanoscale switch accurately predicts thermal actuation behavior. *Nanoscale*, 13: 13746-13757 (2021)
16. **,+Wang, Y., **,+Le, J.V., Crocker, K., **Andrioff, N.R., Croy, C.M., Poirier, M.G., Bundschuh, R.A., **Castro, C.E.** A Nanoscale DNA Force Spectrometer Capable of Applying Tension and Compression on Biomolecules. *Nucleic Acids Research*, 49(15): 8987–8999 (2021)
17. **Huang, C.M., **Kucinic, A., **Johnson, J.A., Su, H.-J.*, and **Castro, C.E.***, Integrated computer-aided engineering and design for DNA assemblies. *Nature Materials*, 20: 1264-1271 (2021)
18. **Johnson, J.A., **Kolliopoulos, V., **Castro, C.E.** Co-self-assembly of multiple DNA origami nanostructures in a single pot. *Chemical Communications*, 57:4795-4798 (2021)
19. Arroyo-Currás N., Sadeia, M., Ng, A.K., Fyodorova, Y., Williams, N., Afif, T., Huang, C.-M., Ogden, N., Andresen Eguiluz, R.C., Su, H.-J., **Castro, C.E.**, Plaxco, K.W., Lukeman, P.S. An electrochemical biosensor exploiting binding-induced changes in electron transfer of electrode-attached DNA origami to detect hundred nanometer-scale targets. *Nanoscale*, 12:13907-13911 (2020)
20. Asghari Adib, A., Sheikhi, A., **Shahhosseini, M., Simeunovic, A., Wu, S., **Castro, C.E.**, Zhao, R., Khademhosseini, A., Hoelzle, D. Direct-write 3D printing and characterization of a GelMA-based biomaterial for intracorporeal tissue engineering. *Biofabrication*, 12(4): 045006 (2020)
21. DeLuca, M., Shi, Z., **Castro, C.E.**, Arya, G. Dynamic DNA Nanotechnology: Toward Functional Nanoscale Devices. *Nanoscale Horizons*, 5, 182-201 (2020)
22. **Johnson, J.A., Dehankar, A., Winter, J., **Castro, C.E.** Reciprocal Control of Hierarchical DNA Origami-Nanoparticle Assemblies. *Nano Letters*, 19(12): 8469-8475 (2019)
23. Zhao, D., **Le, J.V., Darcy,M.A., Poirier, M.G., **Castro, C.E.**, Bundschuh, R. Quantitative Modeling of Concomitant Nucleosome Unwrapping. *Biophysical Journal*, 117(11): 2204-2216 (2019)
24. Presley, K., **Shahhosseini, M., Shi, D., **Castro, C.E.**, Lannutti, J. Analysis of Long-term Optical Performance of Phosphorescent Oxygen Sensing Polymeric Nanofibers. *Polymer Testing,* 80: 106127 (2019)
25. Dehankar, A., Porter, T., **Johnson, J.A., **Castro, C.E.**, Winter, J.O. Compact quantum dot surface modification to enable emergent behaviors in quantum dot-DNA composites. *The Journal of Chemical Physics*, 151:144706 (2019)
26. **Johnson, J.A., Dehankar, A., Kabtiyal, P., Jergens, E., Robbins, S.A., Lee, K., Poirier, M.G., Johnston-Halperin, E., **Castro, C.E.***, Winter, J.O.* Recent Advances in DNA origami-Nanoparticle composites. *Materials Science and Engineering: R*, 138:153-209 (2019)

27. **Halley, P.D., **Patton, R.A., **Chowdhury, A., Byrd, J.C., **Castro, C.E.** Low-cost, simple, and scalable self-assembly of DNA origami nanostructures. *Nano Research,* 12(5):1207-1215 (2019)

28. +McWilliams, E.M., **,+Lucas, C.R., Chen, T., Harrington, B.K., Wasmuth, R., Campbell, A., Rogers, K.A., Cheney, C.M., Mo, X., Andritsos, L.A., Awan, F.T., Woyach, J., Carson III, W.E., Butchar, J., Tridandapani, S., Hertlein, E., **Castro, C.E.**, Muthusamy, N., and Byrd, J.C. Anti-BAFF-R antibody VAY-736 demonstrates promising preclinical activity in CLL and enhances effectiveness of ibrutinib. *Blood Advances*, 3:447-460 (2019)

29. **Huang, C.M., **Kucinic, A., **Le, J.V., **Castro, C.E.***, Su, H-J*. Uncertainty Quantification of a DNA Origami Mechanism Using a Coarse-Grained Model and Kinematic Variance Analysis. *Nanoscale*, 11: 1647-1660 (2019)

30. **Zhou, L., **Marras, A.E., **Castro, C.E.***, Su, H-J.* Paper Origami-Inspired Design and Actuation of DNA Nanorobots with Complex Motions. *Small*, 14(47): 1802580 (2018)

31. **Marras, A.E., Shi, Z., **Lindell, M., **Patton, R., **Huang, C.M., Su, H-J., Arya, G., **Castro, C.E.** Cation-activated actuation for rapid reconfiguration of DNA nanodevices. *ACS Nano*, 12(9): 9484-9494 (2018)

32. Ke, Y., **Castro, C.E.**, Choi, J.H. Structural DNA Nanotechnology: Artificial Nanostructures for Biomedical Research. *Annual Review of Biomedical Engineering*. Invited Review, 20:375–401 (2018)

33. Lauback, S., Mattioli, K.R., **Marras, A.E., Armstrong, M., Rudibaugh, T., Sooryakumar, R., **Castro, C.E.** Real-time Magnetic Control of DNA Nanodevices. *Nature Communications*. 9, Article Number: 1446 (2018)

34. Lei, D., **Marras, A.E., Liu, J., ****Huang, C-M., Zhou, L., **Castro, C.E.**, Su, H-J., Ren, G., 3D Structural Dynamics of DNA origami Mechanisms and Machines Using Individual Particle Electron Tomography. *Nature Communications.* 9, Article Number: 592 (2018)

35. **Castro,C.E.**, Dietz, H., Högberg, B. DNA origami devices for molecular-scale precision measurements. *MRS Bulletin* 42(12): 925-929 (2017)

36. Wang, P., Chatterjee, G., Yan, H., LaBean, T.H., Turberfield, A.J., **Castro, C.E.**, Seelig, G., and Ke, Y. Practical aspects of structural and dynamic DNA nanotechnology. *MRS Bulletin* 42(12): 889-896 (2017)

37. +Akbari, E., **,+Mollica, M., **Lucas, C.R., Bushman, S., **Patton, R.A., Shahhosseini, M., Song, J.W., **Castro, C.E.** Engineering Cell Surface Function with DNA Origami. *Advanced Materials.* 29(46): 1703632 (2017)

38. Shi, Z., **Castro, C.E.**, Arya, G., Conformational Dynamics of Mechanically Compliant DNA Nanostructures from Coarse-Grained Molecular Dynamics Simulations. *ACS Nano*. 11(5): 4617-4630 (2017)

39. **,+Hudoba, M.W., +Luo, Y., **Zacharias, A., Poirier, M., **Castro, C.E.** A Dynamic DNA origami device for measuring compressive depletion forces. *ACS Nano*. 11(7):6566-6573 (2017)

40. Liang, B., Nagarajan, A., **Hudoba, M.W., Alvarez, R., **Castro, C.E.**, Soghrati, S. *ASME Journal of Biomechanical Engineering*. 139(4): 041003 (2017)

41. **Zhou, L., Su, H-J., **Marras, A.E., **Huang, C-M., **Castro, C.E.** Projection kinematic analysis of DNA origami mechanisms based on a two-dimensional image. *Mechanisms and Machine Theory*. 109:22-38 (2017)

42. **Le, J., Luo, Y., Darcy, M.A., **Lucas, C.R., Goodwin, M., Poirier, M.G., **Castro, C.E.** Probing nucleosome stability with a DNA origami nanocaliper. *ACS Nano* 10(7): 7073 – 7084 (2016)

43. **Marras, A.E., **Zhou, L., **Kolliopoulos, V., Su., H., **Castro, C.E.** Directing folding pathways for multi-component DNA origami nanostructures with complex topology. Invited article for special issue on “DNA Nanostructures and Self Assembly,” *New Journal of Physics.* 18: 055005 (2016)
44. **Zhou, L., **Marras, A.E., **Castro, C.E.**, Su, H. Pseudo-rigid-body models of compliant dna origami mechanisms*. ASME Journal of Mechanisms and Robotics* 8(5), 051013 (2016)
45. Kearney, C.J., **Lucas, C.R., O’Brien, F.J., **Castro, C.E.** DNA origami: Folded DNA nanodevices that can direct and interpret cell behavior. *Advanced Materials* 28(27): 5509-5524 (2016)
46. **,+Halley, P., **,+Lucas, C.R., Webber, M.J., McWilliams, E.M., Kural, C., Lucas, D.M., Byrd, J.C., **Castro, C. E.** Daunorubicin-loaded DNA origami nanostructures circumvent drug resistance mechanisms in a leukemia model. *Small*. 12(3):308-320 (2016)
47. **Castro, C.E.**, Su, H., **Marras, A.E., **Zhou, L., **Johnson, J. Mechanical Design of DNA nanostructures. *Nanoscale*. 7:5913-5921 (2015)
48. **Zhou, L., **Marras, A.E., Su. H., **Castro, C.E.** Direct design of an energy landscape with bi-stable DNA origami structures. *Nano Letters*. 15(3): 1815-1821 (2015)
49. **Marras, A.E., **Zhou, L., Su, H., **Castro, C.E.** Programmable motion of DNA origami mechanisms. *Proceedings of the National Academy of Sciences*. 112(3): 713-718 (2015)
50. **Gupta, C., Liao, W.C., Gallego-Perez, D., **Castro, C.E.**, Lee, L. DNA Translocation through Nanochannels under Asymmetric Pulsed Electric Field. *Biomicrofluidics*. 8(2):024114 (2014)
51. **Zhou, L., **Marras, A.E., Su. H., **Castro, C.E.** DNA origami compliant nanostructures with controllable geometry. *ACS Nano*. 8(1): 27-34 (2014)
52. **Nguyen, V., Lilly, B., **Castro, C.E.** The exoskeletal structure and tensile loading behavior of an ant neck joint. *Journal of Biomechanics*, 47(2): 497-504 (2014)
53. Wu, Y., Kwang, K., Agarwal, K., **Marras, A., Wang, C., Mao, Y., Huang, X., Ma, J., Yu, B., Lee, R., Vachani, A., Marcucci, G., Byrd, J., Muthusamy, N., Otterson, G., Huang, K., **Castro, C.E.,** Paulaitis, M., Nano-Sinkam, S., Lee, L.J. Detection of extracellular RNAs in cancer and viral infection via tethered cationic lipoplex nanoparticles containing molecular beacons. *Analytical Chemistry*. 85(32): 11265-11274 (2013)
54. **Castro, C.E.,** Kilchherr F., Kim, D., Lin Shiao, E., Wauer, T., Wortmann, P., Bathe, M., Dietz, HA. Primer to Scaffolded DNA Origami. *Nature Methods.* 8: 221-229 (2011)
55. Jungmann, R., Scheible, M., Kuzyk, A., Pardatscher, G., **Castro, C.E.,** and Simmel FC. DNA origami-based nanoribbons: assembly, length distribution, and twist. *Nanotechnology;* 22(27): 275301 (2011)
56. Wang, L., **Castro, C.E.**, and Boyce, M.C. Growth strain-induced membrane morphology of white blood cells. *Soft Matter*. 7:11319-11324 (2011)
57. **Castro, C.E.,** Dong, J., Lindquist, S., Boyce, M.C., Lang, M.J. Physical Properties of Polymorphic Yeast Prion Amyloid Fibers. *Biophysical Journal.* 101:439-448 (2011)
58. Dong, J., **Castro, C.E.,** Boyce, M.C., Lang, M.J., and Lindquist, S. Optical Trapping with High Forces Reveals Unexpected Behaviors of Prion Fibrils. *Nature Strucural & Molecular Biology.* 17:1422-1430 (2010)
59. Tam, J., **Castro, C.E.,** Heatsh, R.J., Cardenas, M.J., Xavier, R., Lang, M.J., Vyas, J.M. Control and Manipulation of Pathogens with an Optical Trap for Live Cell Imaging of Intercellular Interactions. *PLoS ONE*. 5(12): e15215 (2010)
60. Kim, S.T., Takeuchi, K., Zhen-Yu, J.S., Touma, M., **Castro, C.E.,** Fahmy, A., Vibhuti, D., Kappes, D., Lang, M.J., Wagner, G., Reinherz, E. The alpha beta□T cell receptor is an anisotropic mechanosensor. *Journal of Biological Chemistry.* 284(45): 31028-31037 (2009)

61. Villareal Marroquin, M.G., Sanchez Pena, M.L., **Castro, C.E.,** Castro, J.M., Cabrera Rios, M. Use of data envelopment analysis and clustering in multiple criteria optimization. *Intelligent Data Analysis* 12(1):89-101 (2008)
62. Brau, R.R., Ferrer, J., Lee, H., **Castro, C.E.,** Tam, B., Tarsa, P.B., Matsudaira, P., Boyce, M.C., Kamm, R.D., Lang, M.J. Passive and active microrheology with optical tweezers. *Journal of Optics A: Pure and Applied Optics,* 9, S103-S112, (2007)
63. **Castro, C.E.**, Cabrera Rios, M., Castro, J.M. Lilly, B. Multiple criteria optimization with variability considerations in injection molding. *Polymer Engineering & Science* 47(4): 400-409 (2007)
64. **Castro, C.E.**, Cabrera Rios, M., Lilly, B., Castro, J.M. Simultaneous Optimization of Mold Design and Processing Conditions in Injection Molding. *Journal of Polymer Engineering* 25(6): 459-486 (2005)
65. **Castro, C.E.**, Cabrera Rios, M., Lilly, B., Castro, J.M., Mount-Campbell, C.A. Identifying the best compromises between multiple performance measures in injection molding using data envelopment analysis. *Journal of integrated design & process science* 7(1): 77-87 (2003)

TECHNOLOGY TRANSLATION

Patents

1. **Castro, C.E.**, Byrd, J.C., Halley, P.D., Lucas, C.R., Multi-Functional Cancer Drug Delivery Nanodevice for Precision Medicine (Pending, Application # PCT/US2019/026535)
2. Halley, P.D., **Castro, C.E.**, Lucas, C.R., Shahhosseini, M., Marras, A.E., DNA nanodevice hinge biosensors and methods of use thereof (Patent pending, Application # PCT/US2021/053204)
3. Akbari, E., Shahhosseini, M., **Castro, C.E.**, Song, J., Multiplexed Microfluidic Force Spectroscopy On-a-Chip (Patent pending, Application # PCT/US2022/013819)
4. Shahhosseini, M., Akbari, E., Beshay, P., **Castro, C.E.**, Song, J., Multiplexed detection of cell-molecular interactions with DNA origami engineered cells in 3-D collagen matrices. (Patent pending, application # PCT/US2023/061817)

Entrepreneurship

1. Co-founder, DNA Nanobots, Inc., Company started October 2022

SELECTED TALKS AND SEMINARS

1. C.E. Castro “Engineering DNA Nanodevices for Molecular and Cellular Applicatons.” Miami University Chemistry & Biochemistry Seminar Series, Oct. 6, 2022 (invited talk)
2. C.E. Castro “Engineering DNA Nanodevices for Molecular and Cellular Applicatons.” Institute of Genetics and Molecular and Cellular Biology (IGBMC), Strasbourg, France, July 11, 2022 (invited talk)
3. C.E. Castro “DNA-based nanorobotic devices and materials.” Kent State University, Advanced Materials and Liquid Crystal Institute Materials Day, April 21 2022 (invited talk)
4. C.E. Castro “DNA nanomechanical devices for probing molecular and cellular systems.” Yonsei University, School of Mechanical Engineering Graduate Seminar Series (Invited Virtual Talk), Nov 2020
5. C.E. Castro “Hybrid top-down and bottom-up approach for engineering DNA assemblies.” Invited talk at Foundations of Nanoscience (FNANO) conference, April 2020, Keynote Presentation in Computational Tools track (Note on-site conference was canceled, talk delivered virtually)
6. C.E. Castro, “DNA-based nanorobotics and nanomechanical devices.” Notre Dame University, Mechanical Engineering Department Seminar (Invited Talk), January 2020

7. C.E. Castro, “DNA-based nanorobotics and nanomechanical devices.” Columbia University, Mechanical Engineering Department Seminar (Invited Talk), Nov. 2019
8. C.E. Castro, “A Multifunctional DNA-origami platform for Biomolecular Detection in Cellular Microenvironments.” Biofabrication Conference 2019, Columbus, OH (keynote presentation for *Design, Simulation, and Monitoring* Track), Oct. 2019
9. C.E. Castro, “Design Automation for DNA Origami Mechanisms.” oxDNA users and developers workshop, Oxford University, Oxford, UK. (Invited Talk, remote participant), Sept. 2019
10. C.E. Castro, “DNA nanomechanical devices for probing molecular and cellular systems.” Technische Universität München, 10 years of biomolecular nanotechnology research at TUM workshop (Invited Talk), June 2019
11. C.E. Castro, “DNA nanomechanical devices for probing molecular and cellular systems.” Huazhong University of Science and Technology, School of Automation (Invited Talk), May 2019
12. C.E. Castro, “DNA nanomechanical devices for probing molecular and cellular systems.” Institute for Quantitative Health Science & Engineering and Biomedical Engineering Seminar (invited talk), Dec. 2018
13. C.E. Castro, “Biophysical and Biomedical Applications of DNA nanodevices.” Royal College of Surgeons Ireland (invited talk), August 2018
14. C.E. Castro, “Design, control, and applications of DNA nanomechanical devices.” Cambridge University, Physics Department, June 2018
15. C.E. Castro, “Design, control, and applications of DNA nanomechanical devices.” AMBER Centre, Trinity College Dublin, (invited talk), June 2018
16. C.E. Castro, “Design, control, and applications of DNA nanomechanical devices.” Kent State University, Physics seminar series. Kent, OH (invited talk), February 2018
17. C.E. Castro, “Design and control of DNA origami nanomachines.” International Conference on Natural and Artificial Molecular Machines. Indian Institute of Technology Bombay, Mumbai, India (Invited Talk), December 2017
18. C.E. Castro, “Programming mechanical function via DNA self-assembly.” Materials Research Society Annual Fall Meeting (Invited Talk), November 2017
19. C.E. Castro, “Design, control, and applications of DNA nanomechanical devices.” Boston University, Biophysics seminar series. Boston, MA (invited talk), November 2017
20. C.E. Castro “Self-assembly of DNA nanomechanical devices for biophysical measurements.” University of Pennsylvania, Department of Biochemistry and Molecular Biophysics seminar. Philadelphia, PA (invited talk). October 2017
21. C.E. Castro “Engaging undergraduate (and younger) students in DNA nanotechnology.” DNA23 (invited talk). September 2017
22. C.E. Castro “Design and Control of DNA nanomechanical devices.” Arizona State University, School of Molecular Sciences seminar. Tempe, AZ (invited talk). September 2017
23. C.E. Castro “Self-assembly of DNA nanomechanical devices.” The Ohio State University, Biomedical Engineering Department seminar. Columbus, OH (invited talk). August 2017
24. C.E. Castro “Instrumenting the Cancer micro-environment with DNA nanomachines.” National Institutes of Health Workshop on Emerging Technologies and Inter-disciplinary Team Formation. Bethesda, MD (invited talk). August 2017
25. C.E. Castro “Self assembly of DNA nanomechanical devices.” University of Maryland, Microsystems seminar. College Park, MD (invited talk). May 2017

26. C.E. Castro “DNA origami assemblies with cooperative and communicating conformational changes” Foundations of Nanoscience. Snowbird, UT (contributed talk). 2017
27. C.E. Castro “Self assembly of DNA nanomechanical devices.” Harvard University, Applied Mechanics seminar. Cambridge, MA (invited talk) March 2017
28. C.E. Castro “Self assembly of DNA nanomechanical devices.” University of Wisconsin – Milwaukee, Physics Department seminar. Milwaukee, WI (invited talk) December 2016
29. C.E. Castro “Self assembly of DNA nanomechanical devices.” Oberlin College, Physics & Astronomy Department Seminar Series. Oberlin, OH (invited talk) November 2016
30. C.E. Castro “DNA nanomechanical devices for molecular and cellular applications.” Kavli Frontiers of Science Symposium. Irvine, CA (invited talk). November 2016
31. C.E. Castro “Mechanical Design of DNA origami nanodevices.” Princeton University, Mechanical Engineering Department seminar. Princeton, New Jersey (invited talk). Sept 2016
32. C.E. Castro “Engineering approaches to DNA-based design and assembly.” Spiez CONVERGENCE conference. Spiez, Switzerland. (invited talk) Sept 2016
33. C.E. Castro “Mechanical design of DNA nanostructures and devices.” Air Force Research Lab Soft Matter Seminar (Invited Talk), Dayton, OH, June 2016
34. C.E. Castro “Engineering DNA origami Motion and Structural Dynamics,” 10 years of DNA origami Symposium (invited talk), Pasadena, CA, California Institute of Technology, Mar 2016
35. C.E. Castro “Entropically controlled nanomechanical sensing with DNA origami.” ASME Global Conference on Nanoengineering for Medicine and Biology, Houston, TX (contributed talk) Feb 2016
36. C.E. Castro. “Self-assembly of DNA nanomechanical devices.” University of Illinois Urbana-Champaign (Manufacturing interest group invited talk), Urbana-Champaign, IL, Feb 2016
37. C.E. Castro. “Programming dynamics of DNA origami.” Molecular Programming Project Annual Workshop (invited talk). Seattle, Washington, Jan 2016
38. C.E. Castro. “DNA based nanomechanical devices.” University of Texas Austin (NASCENT center invited talk), Austin, TX, Nov 2015
39. C.E. Castro. “Mechanical Design of DNA nanostructures for physical measurements” Annual Society of Engineering Science Conference, Symposium in honor of Prof. Mary Boyce (invited talk), College Station, TX, Oct 2015
40. C.E. Castro. “Mechanical Design of DNA-based probes and sensors.” Wyss Institute for Biologically Inspired Engineering, Harvard University. Boston, MA. October 2015
41. C.E. Castro. “Mechanical Design of DNA nanostructures and Measurement Devices.” Massachusetts Institute of Technology, Mechanical Engineering Department colloquium (invited talk), Boston, MA, May 2015
42. C.E. Castro. “Mechanical Design of DNA nanostructures and Measurement Devices.” University of California San Diego, Nanoengineering Department seminar series (invited talk), San Diego, CA, April 2015
43. C.E. Castro. “DNA origami Tools for the Study of Chromatin Structure and Dynamics.” ASME Global Conference on Nanoengineering for Medicine and Biology, Minneapolis, MN, April 20, 2015
44. C.E. Castro. “Designing Mechanical Dynamics of DNA origami Nanostructures.” American Chemical Society Midwest Regional Meeting (Invited Talk), Pittsburgh, PA. Oct. 29-30, 2014
45. C.E. Castro. “Mechanically Functional DNA origami Nanostructures.” World Congress of Biomechanics (Invited Talk). Boston, MA. July 6-11, 2014

46. C.E. Castro. “Engaging Undergraduates in Designing and Building Biomolecular Systems.” Physics Research & Education Gordon Conference (Invited Talk), Mt. Holyoke, MA, June 12 2014
47. C.E. Castro. “Modifying DNA Origami Structure and Function with Single-Stranded DNA.” Foundations of Nanoscience (Invited Talk), Snowbird, UT April 2014
48. C.E. Castro. “DNA-based mechanical devices to probe molecular and cellular interactions.” Vanderbilt University. Mechanical Engineering Department Seminar (Invited Talk) Nashville, TN Mar 10, 2014.
49. C.E. Castro. “Design of Mechanically Functional DNA Origami Nanostructures.” Seoul National University, Brain Korea 21 plus program (Invited Talk). Seoul, Korea, Feb 20-21, 2014
50. C.E. Castro. “Controllable DNA nanostructures for delivering and detecting cellular signals.” Johns Hopkins University Biomedical Engineering Department Seminar (Invited Talk) Baltimore, MD, Dec 2, 2013
51. C.E. Castro. “Dynamic Biomolecular Interactions in DNA Origami Design.” *Air Force Research Laboratory, Wright Patterson Air Force Base* (Invited Talk) Dayton, OH, Aug 7, 2012.
52. C.E. Castro. “Programming Biological Self-Assembly for the Design of Nanoscale Engineering Tools and Materials.” *The Ohio State University Biophysics Graduate Program Seminar* (Invited Talk) Columbus, OH, Oct 19, 2011

SYNERGISTIC/SERVICE ACTIVITIES

- Collaborative development of after school STEM and Art club at Metro early college preparatory middle school and Hilltonia Middle School, 2016-2018
- Member American Society of Mechanical Engineers; American Society of Engineering Education; International Society for Nanoscale Science, Computation, and Engineering; Biophysical Society
- Member, Biotransport sub-group, ASME Bioengineering Division, reviewer for Summer Bioengineering, Biotransport, Biomechanics (SB3C) conference abstracts
- Faculty mentor for OSU undergraduate Eminence Scholars program
- Faculty mentor for Lambda Psi Minority Engineering Honorary
- Yearly mentor for over 10 students for Translating Engineering Research to K-8 Program (TEK-8) summer REU program.
- Advisor for OhioMOD – Ohio State University Biomolecular Design Project Team
- Biomolecular design workshop for STEM leadership camp at Ohio State University
- Designed new graduate course in Mechanics of Biomolecular Systems (Ohio State University) including laboratory component focused on DNA self-assembly
- Regular guest Speaker for Engineering Pre-freshman and Cooperative Education program (Ohio State University)
- Peer reviewer for Nature, Journal of Computational Chemistry, Nature Chemistry, Journal of Experimental Biology, Nanoscale, Nano Letters, ACS Nano, Nature Communications, Science Advances, Bio-Systems, Small, Robotics and Automation, ACS Omega, Nucleic Acids Research, Advanced Materials
- Member General Education Revision committee (University committee), only representative from College of Engineering
- National Science Foundation, Office of Naval Research, Army Research Office panel reviewer for multiple programs (typically 1-2 review panels yearly)
- Ad hoc reviewer for MacArthur Fellows, NSF, European Research Council

- Session organizer and co-chair at 2014 World Congress of Biomechanics
- Session organizer and co-chair for OSU IMR Materials Week Symposium 2013, 2014, 2016, 2019, 2023
- Participant in MRS/Kavli Future of Materials Workshop on Nucleic Acid Nanotechnology
- Symposium Organizer APS (DSOFT) March 2020 Meeting on “Remote Control of Molecular Devices”

RESEARCH SUPPORT (completed and current)

Funding amounts indicate total for each award.

- External funding total = $12,229,225
- External funding total as PI = $7,174,453
- Castro Lab share of external grants = ~$4,300,000
- Internal funding total = $768,700
- Castro Lab share of internal grants = ~$608,000

Completed:

External

1. PI: NSF BRIGE grant No. 1228104, Title: BRIGE: Fluorescence Based Single Molecule Force Spectroscopy with DNA Nanotechnology, 2012-2014, $175,000
2. PI: NSF grant No. 1235060, Title: Design of DNA origami machines and mechanisms, 2012-2016, $410,000
3. PI: NSF CAREER grant No. 1351159, Title: CAREER: A Molecular Force Sensor for Single Molecule Studies of Cellular Force Application, 2014-2019, $435,613
4. PI: NIH grant No. R21CA174583-01, Title: Nanoscale tools for functional studies of cancer-relevant chromatin modifications, 2013-2016, $614,692
5. Co-PI: NIH grant No. R21CA179403, Title: Plasma RNA based early lung cancer detection by tethered cationic lipoplex assay, 2013-2016, $334,044
6. Co-PI: NIH grant No. R21CA185707, Title: Tethered cationic lipoplex nanoparticle assay for liver cancer detection, 2014-2016, $352,594
7. Co-PI: NSF grant No. 1516976, Title: Chromatin Structural Dynamics Studied with DNA Origami Nanotechnology, 2015-2017, $350,000
8. Co-PI: NIH grant No. 1R01CA197870, Title: Improving BTK directed therapy for CLL, 2015-2020, $1,750,806
9. Co-PI: NSF grant No. 1536862, Title: Robust design of compliant dna origami mechanisms, 2015-2018, $419,522
10. Co-PI: NSF grant No. 1715321, Title: Mechanistic studies of heterochromatin mesoscale structural dynamics with DNA origami nanotechnology, 2017-2020, $647,328
11. PI: American Heart Association grant No. 17IRG33460357, Title: A molecular biophysical approach for studying transvascular function in vitro, 2017-2019, $150,000
12. Co-PI: Department of Energy grant No. DE-SC0017270, Title: Exploring fundamental properties of dynamic DNA origami-nanoparticle composites, 2017-2020, $1,170,000
13. Co-PI: Department of Energy grant No. DE-SC0017270 Renewal, Title: Reciprocal Energy Exchange in Hierarchical DNA Origami-Nanoparticle Composites, 2020-2023, $1,350,000

Internal

14. PI: Ohio State University Cancer Center, Career Development Award from OSU Leukemia SPORE, Title: Characterization of Co-stimulatory Signaling Effects on Survival and Proliferation of B cell Malignancies, 2012-2014, $176,000
15. PI: OSU Center for Emergent Materials (NSF MRSEC) Exploratory Research Seed Grant, Title: DNA-based molecular actuators for novel smart material systems, 2012-2013, $40,000
16. Inter-disciplinary Research Group co-lead: OSU Center for Emergent Materials (NSF MRSEC) proto-IRG Seed Grant, Title: protoIRG: Functional Dynamics of DNA based nanostructures, 2012-2014, $200,000
17. PI: OSU Center for Emergent Materials (NSF MRSEC) Multi-Disciplinary Team Building Seed Grant, Title: DNA devices for probing nanoscale fluid mechanics, 2015-2016, $60,000
18. PI: OSU Drug Development Institute, Title: DNA origami nanodevices for controlled T cell activation, Jan – Dec 2019, $105,400
19. PI: OSU Corporate Engagement Office, Title: Rapid COVID-19 Diagnostic Testing using DNA origami Nanostructures, March 2021 – January 2022, $96,509
20. PI: Ohio State Office of Research COVID-19 Seed Grants, Title: Rapid COVID-19 Diagnostic Testing with DNA origami nanostructures, May 2020 – June 2021, $37,329

Current:

External

1. Multi-PI (one of three PIs): NIH grant No. 1R01HL141941-01, Title: Biophysical-based approach for controlling blood vessel structure and function, 2018-2022 (currently in NCE), $1,689,148
2. Co-PI (PI: R. Sooryakumar): National Science Foundation grant No. 1916740, Title: Real time magnetic control of DNA origami devices and metamaterials, 2019-2022 (Currently in NCE), $450,000
3. PI: National Science Foundation grant No. 1921881, Title: DMREF: Collaborative research: DNA-based sensing, communicating, and phase-separating materials, 2019-2023, $1,700,000 (PI for OSU portion, which is $1,268,729, rest is to Duke University with Gaurav Arya as PI)
4. PI: National Science Foundation grant No. 1933344, Title: EFRI CEE: DNA origami tools to engineer chromatin structure and function in live cells, 2019-2023, $2,000,000
5. co-PI (PI: Ben Walter): NIH grant No. R21AR076611 (currently in NCE), Title: Osmotic Properties of Healthy and Degenerated Cell Pericellular Matrix, 2020-2021, $408,009
6. PI: National Science Foundation grant No. 2044601, PFI-TT (currently in NCE): DNA Sensors for Rapid Detection of COVID-19 and other Viral Diseases with High Sensitivity, June 2021 – Nov 2022, $249,999

Internal

1. co-PI (PI is Dr. Chrus Lucas, Research Scientist in Castro Lab): OSU Center for Cancer Engineering Seed Grant: Targeted Drug Delivery to AML with DNA origami Nanostructures, July 2022 – December 2023, $150,000

Past and Current Doctoral and Post-doctoral Trainees

Previous post-doctoral Trainees:

1. Dr. Chris Lucas, currently Research Scientist at Ohio State University between Comprehensive Cancer Center and Department of Mechanical and Aerospace Engineering
2. Niksa Roki, PhD from University of Maryland, starting in July 2020, Recently received and accepted Pelotonia post-doctoral fellowship (co-mentored with Meixiao Long and John Byrd from OSU CCC), Currently post-doctoral research at University of Miami
3. Golbard Mohammadiroozbahani, PhD from Illinois Institute of Technology, started February 2020, supported by NSF funding (co-mentored with Michael Poirier from Department of Physics), Currently staff scientist at Pfizer.

Current post-doctoral trainees:

1. Wolfgang Pfeifer, PhD from University of Duisberg-Essen in Germany, started January 2020, supported by NSF funding (co-mentored with Michael Poirier from Department of Physics)

Graduated PhD Trainees:

1. Cherry Gupta, PhD in Mechanical Engineering 2014, co-advised with Dr. L. James Lee. Currently Research Engineer at Battelle Memorial Institute, Columbus, Ohio
2. Michael Hudoba, PhD in Mechanical Engineering 2016, Currently Professor at Otterbein University, won Best Young Teacher at Otterbein University
3. Alexander Marras, PhD in Mechanical Engineering 2017, Currently post-doctoral researcher at University of Chicago (Institute of Molecular Engineering) in Laboratory of Dr. Matthew Tirrell. Currently on academic job market.
4. Lifeng Zhou, PhD in Mechanical Engineering 2017, co-advised with Dr. Hai-Jun Su. Currently post-doctoral researcher at Albany University (RNA Institute) in Laboratory of Dr. Ken Halvorsen. Recently submitted NIH K99 award application.
5. Randy Patton, PhD in Mechanical Engineering 2017, Currently Staff Engineer at Intel Corp., Portland, Oregon.
6. Jenny Le, PhD in Biophyiscs, 2018, Currently post-doctoral researcher at UCLA Department of Mechanical Engineering in laboratory of Dr. Elisa Franco
7. Joshua Johnson, PhD in Biophysics in 2019, Currently post-doctoral researcher at Imperial College London in laboratory of Lorenzo Di Michelle
8. Chao Min Huang, PhD in Mechanical Engineering 2020, co-advised with Dr. Hai-Jun Su. Currently post-doctoral researcher at Duke University in the Laboratory of Dr. Gaurav Arya.
9. Melika Shahhosseini, PhD in Mechanical Engineering December 2022, currently postdoctoral researcher in my laboratory
10. Yuchen Wang, PhD in Mechanical Engineering May 2023

Graduated M.S. students:

1. Vienny Nguyen, 2013, went to NASA as robotics engineer
2. Daniel Turowski, 2013, went to Microsoft as hardware design engineer
3. Emily Briggs, 2014, engineer at technology start-up
4. Carl Miller, 2015, went to Mubea as design engineer
5. Molly Mollica, 2016, currently in PhD program in Bioengineering at University of Washington
6. Patrick Halley, 2016, currently staff research engineer in Castro Lab at OSU
7. Andres Serrano Paladines, 2020, Mechanical Engineering
8. Miguel Pedrozo, 2021, Mechanical Engineering, Battelle Memorial Institute
9. Kehao Huang, 2022, Mechanical Engineering, Currently ME PhD student

Current PhD Trainees:

1. Peter Beshay, Mechanical Engineering, expected graduation 2023, post-candidacy
2. Anjelica Kucinic, Chemical and Biomolecular Engineering, post-candidacy, expected graduation 2023.
3. Diana Lopez, Biophysics Graduate Program, post-candidacy, expected graduation 2024
4. Teng Teng, Mechanical Engineering, expected graduation 2023, post-candidacy
5. Yin Wei, Biophysics Graduate Program, expected graduation 2025, post-candidacy
6. Kehao Huang, Mechanical Engineering, expected graduation 2025, pre-candidacy

Current M.S. students:

1. Marissa Kruse, Mechanical Engineering, expected graudation 2024

Undergraduate students advised:

- Over 30 UG researchers advised including 11 UG theses

- 5 UG students have been co-authors on manuscripts
- UG research advisees currently pursuing PhD programs at Georgia Tech, UC Berkeley, UIUC, Washington University, University of Texas Austin, Duke University, North Carolina State University, Wake Forest University, Case Western University, University of Michigan, and Ohio State University.

Teaching Experience

Student evaluation scores out of 5.0-point scale

- Strength of Materials, 2nd year core course in Mechanical Engineering
    - Winter 2012 (quarter system), 84 students, Overall student evaluation score = 4.4 (University average for similar courses = 4.1)
    - Autumn 2012 (semester system, all subsequent on semesters), 77 students, Overall student evaluation score = 4.5 (University average for similar courses = 4.1)
    - Autumn 2014 (taught two sections), 81 students, Overall student evaluation score = 4.5 (University average for similar courses = 4.1)
    - Autumn 2014 (taught two sections), 115 students, Overall student evaluation score =4.6 (University average for similar courses = 4.1)

- Statics and Strength of Materials, 2nd year course for non-ME Engineering majors
    - Spring 2013, 126 students, Overall student evaluation score = 4.6 (University average for similar courses = 4.1)
    - Spring 2014, 133 students, Overall student evaluation score = 4.5 (University average for similar courses = 4.1)

- Design and Analysis of Machine Elements II, 3rd year core course in Mechanical Engineering
    - Autumn 2015, 95 students, Overall student evaluation score = 3.4 (University average for similar courses = 4.1)
    - Autumn 2016, 81 students, Overall student evaluation score = 4.6 (University average for similar courses = 4.2)
    - Autumn 2017, 79 students, Overall student evaluation score = 4.6 (University average for similar courses = 4.2)

- Kinematics and Mechanism Design, 3rd year core course in Mechanical Engineering
    - Autumn 2018, 62 students, Overall student evaluation score = 3.2 (University average for similar courses = 4.2)
    - Autumn 2018, 77 students. (taught two sections), Overall student evaluation score = 4.0 (University average for similar courses = 4.2)
    - Autumn 2019, 57 students, Overall student evaluation score = 4.25 (University average for similar courses = 4.37)
    - Autumn 2019, 80 students, Overall student evaluation score = 4.26 (University average for similar courses = 4.27)

- ME/AE 4999/4999H, senior students pursuing a thesis in Mechanical or Aerospace Engineering
    - Autumn 2019, 15 students, Overall student evaluation score = 4.29 (University average for similar courses = 4.36)

- Mechanics of Biomolecular Systems, Course was developed by Prof. Castro and is taken by graduate students and senior undergraduate students
    - Spring 2013, 10 students, Overall student evaluation score = 5.0 (University average for similar courses = 4.5)

- Spring 2014, 24 students, Overall student evaluation score = 5.0 (University average for similar courses = 4.3)
- Spring 2015, 11 students, Overall student evaluation score = 4.4 (University average for similar courses = 4.5)
- Spring 2016, 19 students, Overall student evaluation score = 4.5 (University average for similar courses = 4.5)
- Spring 2017, 25 students, Overall student evaluation score = 4.8 (University average for similar courses = 4.4)
- Spring 2018, 22 students, Overall student evaluation score = 4.5 (University average for similar courses = 4.4)
- Spring 2019, 16 students, Overall student evaluation score = 4.8 (University average for similar courses = 4.3)