

# Nicholas Stephanopoulos

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## EMPLOYMENT

### **Arizona State University, Tempe**

**2015 - present**

Associate Professor (with tenure): School of Molecular Sciences  
Associate Director: The Biodesign Institute Center for Molecular Design and Biomimetics  
Graduate Faculty: School of Biological and Health Systems Engineering  
Graduate Faculty: Chemical Engineering (SEMTE)  
Associate Faculty: Center for Sustainable Macromolecular Materials and Manufacturing (SM3)  
Affiliate Faculty: The Biomimicry Center  
Affiliate Faculty: The Global Security Initiative (GSI)

**Research interests:** Protein/peptide-DNA nanomaterials via self-assembly, with applications in biology, medicine, energy, engineering, and nano-robotics

**Google Scholar profile:** <https://scholar.google.com/citations?user=1n9zJi8AAAAJ&hl=en>

## EDUCATION AND TRAINING

### **Northwestern University, Chicago**

**2011 - 2015**

Postdoctoral research  
Simpson Querrey Institute for BioNanotechnology (SQI)  
Advisor: Prof. Samuel I. Stupp  
Research focus: Self-assembling peptide and peptide-DNA biomaterials

### **University of California, Berkeley**

**2005 - 2010**

Ph.D. in Chemistry (2010)  
Thesis advisor: Prof. Matthew B. Francis  
Dissertation title: "Integrated Nanosystems Templated by Self-assembled Virus Capsids"  
GPA: 4.0/4.0

### **Massachusetts Institute of Technology**

**2004 - 2005**

Master of Science in Chemical Engineering Practice, MSCEP (2007)  
GPA: 3.9/4.0

### **Harvard University**

**2000 - 2004**

A.B. in Chemistry, *summa cum laude* (2004)  
Research advisor: Prof. Xiaowei Zhuang  
GPA: 3.9/4.0

## AWARDS AND HONORS

- **2023:** Appointed Associate Director of the Center for Molecular Design and Biomimetics at ASU
- **2018:** NIH Director's New Innovator Award
- **2018:** NSF CAREER Award
- **2018:** Selected as Scialog Fellow (Research Corporation for Science Advancement and the Gordon and Betty Moore Foundation)

- **2017:** Elsa U. Pardee Foundation Award for Cancer Research
- **2016:** Air Force Office of Scientific Research (AFOSR) Young Investigator Program Award
- **2012:** NIH Ruth L. Kirschstein NRSA Postdoctoral Fellowship
- **2011:** International Institute for Nanotechnology (IIN) Postdoctoral Fellowship at Northwestern
- **2008:** Teaching Effectiveness Award. One of only seven teaching assistants honored.
- **2008:** Outstanding Graduate Student Instructor Award (awarded to top 10% of GSI's), UC Berkeley
- **2007:** J. Edward Vivian Award for exemplary performance at the MIT Practice School
- **2004:** Graduated *summa cum laude* (top 4% of class) from Harvard University
- **2004:** Elected to the Phi Beta Kappa Society, Harvard University
- **2001-2003:** Earned prizes each year (Detur Book Prize, Harvard College Prize, John Harvard Prize) for being in top 10% of class, Harvard University

## **PUBLICATIONS**

### **INDEPENDENT CAREER (\* = CORRESPONDING AUTHOR):**

- R. Zheng<sup>‡</sup>, Y. Xu<sup>‡</sup>, A. Prasad<sup>‡</sup>, M. Liu, X. Zhou, R. Porter, M. Sample, E. Poppleton, J. Procyk, H. Liu, S. Wang, Y. Li, H. Yan\*, P. Sulc\*, **N. Stephanopoulos\***, “High-affinity binding to the SARS-CoV-2 spike trimer by a nanostructured, trivalent protein-DNA synthetic antibody” (*submitted*; ‡ co-first authors)  
pre-print available on bioRxiv: <https://www.biorxiv.org/content/10.1101/2023.09.18.558353v1>
- L. Naser, W.S. Weiner, D. Thifault, E. Stahl, L. McCreary, R. Nott, C. Quick, A. Buchberger, C. Alvarado, A. Rivera, J.A. Miller, R. Khatiwala, J.M. Garcia, **N. Stephanopoulos**, P. Fromme, W. Cance, T. Marlowe, “Structure-based discovery of hydrocarbon-stapled paxillin peptides that block focal adhesion kinase scaffolding in cancer” (*submitted*)
- A. Novacek, B. Ugaz, **N. Stephanopoulos\***, “Templating peptide chemistry with nucleic acids: towards artificial ribosomes, cell-specific therapeutics, and novel protein-mimetic architectures” (*submitted*; invited review for *Biomacromolecules*)
- H. Liu, M. Matthies, J. Russo, L. Rovigatti, R.P. Narayanan, T. Diep, D. McKeen, O. Gang, **N. Stephanopoulos**, F. Sciortino, H. Yan, F. Romano, P. Sulc\*, “Inverse design of a pyrochlore lattice of DNA origami through model-driven experiments” *Science* **2024**, *384*, 776-781.
- T. Teng, J. Bernal-Chanchavac, **N. Stephanopoulos**, C. Castro\*, “Construction of reconfigurable and polymorphic DNA origami assemblies with coiled-coil patches and patterns” *Adv. Sci.* **2024** (*accepted*; ASAP article available online: <https://onlinelibrary.wiley.com/doi/10.1002/advs.202307257>)
- Q. Lu, Y. Xu, E. Poppleton, K. Zhou, P. Sulc, **N. Stephanopoulos\***, Y. Ke\*, “DNA-Nanostructure Guided Assembly of Proteins into Programmable Shapes” *Nano Lett.* **2024**, *24*, 1703-1709.
- F.M. Fumasi, T. MacCulloch, J. Bernal-Chanchavac, **N. Stephanopoulos**, J.L. Holloway\*, “Using dynamic biomaterials to study the temporal role of bioactive peptides during osteogenesis” *Biomater. Adv.* **2024**, *157*, 213726.
- R.P. Narayanan, A. Prasad, A. Buchberger, L. Zou, J. Bernal-Chanchavac, T. MacCulloch, N.E. Fahmi, H. Yan, F. Zhang M.J. Webber\*, **N. Stephanopoulos\***, “High-affinity host–guest recognition for efficient assembly and enzymatic responsiveness of DNA nanostructures” *Small* **2023**, *20*, 2307585.
- L. Yu, Y. Xu, M. Al-Amin, S. Jiang, M. Sample, A. Prasad, **N. Stephanopoulos**, P. Sulc, H. Yan\*, “CytoDirect: a DNA nanodevice for specific and efficient delivery of functional payloads to the cytoplasm” *J. Am. Chem. Soc.* **2023**, *145*, 27336–27347.
- C.R. Simmons, A. Buchberger, S.J.W. Henry, A. Novacek, N.E. Fahmi, T. MacCulloch, **N. Stephanopoulos\***, H. Yan\*, “Site-specific arrangement and structure determination of minor groove binding molecules in self-assembled three-dimensional DNA crystals” *J. Am. Chem. Soc.* **2023**, *145*, 26075–26085.
- Y.-Y. Hsu, S.J. Chen, J. Bernal-Chanchavac, B. Sharma, H. Moghimianavval, **N. Stephanopoulos**, and A.P. Liu\*, “Calcium-triggered DNA-mediated membrane fusion in synthetic cells” *Chem. Commun.* **2023**, *59*, 8806-8809.
- A. Buchberger, M. Al-Amin, C.R. Simmons, **N. Stephanopoulos\***, “Self-assembly of hybrid peptide-DNA nanostructures using homotrimeric coiled-coil/nucleic acid building blocks” *ChemBioChem* **2023**, *17*, e202300223. (Featured cover article)

- Z. Zhang, J. Sponer, G. Bussi, V. Mlynsky, P. Sulc, C.R. Simmons, **N. Stephanopoulos**, M. Krepl\*, “Atomistic picture of opening–closing dynamics of DNA Holliday junction obtained by molecular simulations” *J. Chem. Inf. Model.* **2023**, *63*, 2794-2809.
- **N. Stephanopoulos\***, R. Freeman, H. Yan, “Self-Assembling Biomaterials from Proteins, Peptides, and DNA” *ACS Applied Bio Materials* **2022**, *5*, 4579-4580. (Guest Editor editorial for special issue)
- A. Buchberger<sup>‡</sup>, K. Riker<sup>‡</sup>, J. Bernal-Chanchavac, R.P. Narayanan, C.R. Simmons, N.E. Fahmi, R. Freeman\*, **N. Stephanopoulos\***, “Bioactive Fibronectin-III<sub>10</sub>-DNA Origami Nanofibers Promote Cell Adhesion and Spreading” *ACS Applied Bio Materials* **2022**, *5*, 4625-4634. (‡ co-first authors)
- R.P. Narayanan<sup>‡</sup>, J. Procyk<sup>‡</sup>, P. Nandi<sup>§</sup>, A. Prasad<sup>§</sup>, Y. Xu<sup>§</sup>, E. Poppleton, D. Williams, F. Zhang, H. Yan, P.-L. Chiu\*, **N. Stephanopoulos\***, P. Sulc,\* “Coarse-grained simulations for the characterization and optimization of hybrid protein-DNA nanostructures” *ACS Nano* **2022**, *16*, 14086–14096. (‡ co-first authors; § co-second authors)
- B.I. Martinez, G.A. Mousa, K. Fleck, T. MacCulloch, C.W. Diehnelt, **N. Stephanopoulos**, S.E. Stabenfeldt\*, “Uncovering temporospatial sensitive TBI targeting strategies via in vivo phage display” *Sci. Adv.* **2022**, *8*, eabo5047.
- A. Frtus, B. Smolkova, M. Uzhytchak, M. Lunova, M. Jirsa, S.J.W. Henry, A. Dejneka, **N. Stephanopoulos\***, O. Lunov\*, “The interactions between DNA nanostructures and cells: A Roadmap for Successful Applications in Biomedicine A critical overview from a cell biology perspective” *Acta Biomaterial.* **2022**, *146*, 10-22.
- J. Bernal-Chanchavac<sup>‡</sup>, M. Al-Amin<sup>‡</sup>, **N. Stephanopoulos\***, “Nanoscale structures and materials from the self-assembly of polypeptides and DNA” *Curr. Top. Med. Chem.* **2022**, *22*, 699-712.
- C.R. Simmons<sup>‡</sup>, T. MacCulloch<sup>‡</sup>, M. Krepl, M. Matthies, A. Buchberger, I. Crawford, J. Sponer, P. Sulc, Y. Liu, **N. Stephanopoulos\***, H. Yan\*, “The influence of Holliday junction sequence and dynamics on DNA crystal self-assembly” *Nat. Commun.* **2022**, *13*, 3112.
- A.P. Liu\*, E. Appel, P. Ashby, B. Baker, E. Franco, L. Guo, K. Haynes, N. Joshi, A. Kloxin, P. Kouwer, J. Mittal, L. Morsut, V. Noireaux, S. Parekh, R. Schulman, S. Tang, M. Valentine, S. Vega, W. Weber, **N. Stephanopoulos\***, O. Chaudhuri\*, “The living interface between synthetic biology and biomaterial design” *Nat. Mater.* **2022**, *21*, 390-397. (see also accompanying Editorial: <https://www.nature.com/articles/s41563-022-01234-0>)
- T. MacCulloch, A. Novacek, **N. Stephanopoulos\***, “Proximity-enhanced synthesis of DNA-peptide-DNA triblock molecules” *Chem. Commun.* **2022**, *58*, 4044-4047.
- A. Gangrade\*, **N. Stephanopoulos**, D. Bhatia\*, “Programmable, self-assembled DNA nanodevices for cellular programming and tissue engineering” *Nanoscale*, **2021**, *13*, 16834-16846.
- B. Smolkova, T. MacCulloch, T. Rockwood, M. Liu, S.J.W. Henry, A. Frtus, M. Uzhytchak, M. Lunova, M. Hof, P. Jurkiewicz, A. Dejneka, **N. Stephanopoulos\***, O. Lunov\*, “Effect of the protein corona on endosomal escape of functionalized DNA nanostructures” *ACS Appl. Mater. Interfaces* **2021**, *13*, 46375–46390.
- T. Yuan, Y. Shao, X. Zhou, Q. Liu, Z. Zhu, B. Zhou, Y. Dong, **N. Stephanopoulos**, S. Gui\*, H. Yan\*, D. Liu\*, “Highly permeable DNA supramolecular hydrogel promotes neurogenesis and functional recovery after completely transected spinal cord injury” *Adv. Mater.* **2021**, *33*, 2102428.
- S.J.W. Henry, **N. Stephanopoulos\***, “Functionalizing DNA nanostructures for therapeutic applications” *Wiley Interdiscip. Rev. Nanomed. Nanobiotechnol.* **2021**, *13*, e1729.
- A. Buchberger<sup>‡</sup>, H. Saini<sup>‡</sup>, K.R. Eliato<sup>‡</sup>, R. Merkley, Y. Xu, A. Zare, J. Bernal, R. Ros\*, M. Nikkhah\*, **N. Stephanopoulos\***, “Reversible control of gelatin hydrogel stiffness using DNA crosslinkers” *ChemBioChem* **2021**, *22*, 1755-1760. (‡ co-first authors; selected as a “Very Important Paper” by the journal)
- **N. Stephanopoulos\***, P. Sulc, “DNA nanodevices as mechanical probes of protein structure and function” *Appl. Sci.* **2021**, *11*, 2802.
- C.R. Simmons<sup>‡</sup>, T. MacCulloch<sup>‡</sup>, F. Zhang, Y. Liu, **N. Stephanopoulos\***, H. Yan\*, “Self-Assembly of a DNA Crystal Scaffold Containing Modular Cavities for the Precise Arrangement of Macromolecules” *Angew. Chem. Int. Ed.* **2020**, *59*, 18619-18626. (‡co-first authors)
- F.M. Fumasi, **N. Stephanopoulos**, J.L. Holloway\*, “Reversible Control of Biomaterial Properties for Dynamically Tuning Cell Behavior” *J. Appl. Polym. Sci.* **2020**, *137*, e49058.

- **N. Stephanopoulos\***, “Hybrid nanostructures from the self-assembly of proteins and DNA” *Chem* **2020**, *6*, 364-405.
- A. Buchberger, C.R. Simmons, N.E. Fahmi, R. Freeman, **N. Stephanopoulos\***, “Hierarchical assembly of nucleic acid/coiled-coil peptide nanostructures” *J. Am. Chem. Soc.* **2020**, *142*, 1406-1416. (selected as “ACS Editor’s Choice” article; designated one of the most highly cited publications from 2020-2021 by JACS)
- T. Mahatmanto\*, I. Azizah, A. Buchberger, **N. Stephanopoulos**, “Progress toward sourcing plants for new bioconjugation tools: a screening evaluation of a model peptide ligase using a synthetic precursor” *3 Biotech* **2019**, *9*, 442.
- **N. Stephanopoulos\***, “Peptide-DNA hybrid molecules for bioactive nanomaterials” *Bioconjugate Chem.* **2019**, *30*, 1915-1922. (selected as “ACS Editor’s Choice” article)
- **N. Stephanopoulos\***, “Strategies for stabilizing DNA nanostructures to biological conditions” *ChemBioChem* **2019**, *20*, 2191-2197.
- Y. Xu, S. Jiang, C. Simmons, R.P. Narayanan, F. Zhang, A.-M. Aziz, H. Yan, **N. Stephanopoulos\***, “Tunable nanoscale cages from self-assembling DNA and protein building blocks” *ACS Nano* **2019**, *13*, 3545–3554.
- A. Stelson, M. Liu, C. Little, C. Long, N. Orloff, **N. Stephanopoulos\***, J. Booth\*, “Label-free detection of conformational changes in switchable DNA nanostructures with microwave microfluidics” *Nat. Commun.* **2019**, *10*, 1174.
- T. MacCulloch<sup>‡</sup>, A. Buchberger<sup>‡</sup>, **N. Stephanopoulos\***, “Emerging applications of peptide-oligonucleotide conjugates: bioactive scaffolds, self-assembling systems, and hybrid nanomaterials” *Org. Biomol. Chem.* **2019**, *17*, 1668-1682. (‡ co-first authors)
- M. Liu, S. Jiang, O. Loza, N.E. Fahmi, P. Sulc, **N. Stephanopoulos\***, “Rapid photo-actuation of a DNA nanostructure using an internal photocaged trigger strand” *Angew. Chem. Int. Ed.* **2018**, *57*, 9341-9345. (selected as paper for Wiley’s Joint Special Collection on Biopolymers, for the Murray Goodman Award Symposium at the 2019 ACS Spring Meeting: [bit.ly/wileybiopolymers19](http://bit.ly/wileybiopolymers19))
- **N. Stephanopoulos\***, R. Freeman\*, “DNA-based materials as self-assembling scaffolds for interfacing with cells”, “Self-Assembling Biomaterials: Molecular Design, Characterization and Application in Biology and Medicine, 1<sup>st</sup> Edition” **2018**, pp. 157-175. (Elsevier)
- L. Avolio, D. Sipes, **N. Stephanopoulos**, S. Sur\*, “Recreating stem-cell niches using self-assembling biomaterials”, “Self-Assembling Biomaterials: Molecular Design, Characterization and Application in Biology and Medicine, 1<sup>st</sup> Edition” **2018**, pp. 421-454. (Elsevier)
- C. Simmons, F. Zhang, T. MacCulloch, N.E. Fahmi, **N. Stephanopoulos**, Y. Liu, N. Seeman, H. Yan\*, “Tuning the Cavity Size and Chirality of Self-Assembling 3D DNA Crystals” *J. Am. Chem. Soc.* **2017**, *139*, 11254-11260.
- D. Varun, G.R. Srinivaan, Y.-H. Tsai, H.-J. Kim, J. Cutts, F. Petty, R. Merkley, **N. Stephanopoulos**, D. Dolezalova, M. Marsala, D.A. Brafman\*, “A Robust Vintronectin-Derived Peptide for the Scalable Long-term Expansion and Neuronal Differentiation of Human Pluripotent Stem Cell (hPSC)-derived Neural Progenitor Cells (hNPCs)” *Acta Biomater.* **2017**, *48*, 120-130.

#### POSTDOCTORAL AND GRADUATE RESEARCH (\* = CO-FIRST AUTHOR):

- R. Freeman, M. Han, Z. Álvarez, J.A. Lewis, J.R. Wester, **N. Stephanopoulos**, M.T. McClendon, C. Lynsky, J.M. Godbe, H. Sangji, E. Luijten, S.I. Stupp, “Reversible self-assembly of superstructured networks” *Science* **2018**, *362*, 808-813.
- J.J. Greene, M.T. McClendon, **N. Stephanopoulos**, Z. Alvarez, S.I. Stupp, C.-P. Richter, “Electrophysiological Assessment of a Peptide Amphiphile Nanofiber Nerve Graft for Facial Nerve Repair” *J. Tissue Eng. Regen. Med.* **2018**, *12*, 1389–1401.
- A.J. Matsuoka, Z.A. Sayed, **N. Stephanopoulos**, E.J. Berns, A.R. Wadhvani, Z.D. Morrissey, D.M. Chadly, S. Kobayashi, A.N. Edelbrock, T. Mashimo, C.A. Miller, T.L. McGuire, S.I. Stupp, J.A. Kessler “Creating a stem cell niche in the inner ear using self-assembling peptide amphiphiles” *PLoS ONE* **2017**, *12*, e0190150.
- R. Freeman\*, **N. Stephanopoulos\***, Z. Álvarez, J.A. Lewis, S. Sur, C.M. Serrano, J. Boekhoven, S.S. Lee, S.I. Stupp, “Instructing cells with programmable DNA-peptide hybrids” *Nat. Commun.* **2017**, *8*, 15982.

- C. Rubert-Perez, **N. Stephanopoulos**, S.S. Lee, S. C. Newcomb, Sur, S.I. Stupp, “The Powerful Functions of Peptide-Based Bioactive Matrices for Regenerative Medicine” *Ann. Biomed. Eng.* **2015**, *43*, 501-514.
- **N. Stephanopoulos**, R. Freeman, H.N. Scheler, S. Sur, S. Jeong, F. Tantakitti, J.A. Kessler, S.I. Stupp, “Bioactive DNA-Peptide Nanotubes Enhance the Differentiation of Neural Stem Cells Into Neurons” *Nano Lett.* **2015**, *15*, 603-609.
- A. Li, A. Hokugo, A. Yalom, E.J. Berns, **N. Stephanopoulos**, M.T. McClendon, L.A. Segovia, I. Spigelman, S.I. Stupp, R. Jarrahy., “A bioengineered peripheral nerve construct using aligned peptide amphiphile nanofibers” *Biomaterials* **2014**, *35*, 8780-8790.
- J. Sack, **N. Stephanopoulos**, D.C. Austin, M.B. Francis, J.S. Trimmer, “Antibody-guided photoablation of voltage-gated potassium channels” *J. Gen. Physiol.* **2013**, *142*, 315-324.
- **N. Stephanopoulos**, J.H. Ortony, S.I. Stupp, “Self-Assembly for the Synthesis of Functional Biomaterials” *Acta Materialia* (special Diamond Jubilee Issue), **2013**, *61*, 912-930.
- **N. Stephanopoulos**, M.B. Francis, “Making New Materials from Viral Capsids” “Polymer Science: A Comprehensive Reference, 1<sup>st</sup> Edition” **2012**, Vol. 9, pp. 247-266. (Elsevier)
- **N. Stephanopoulos**, M.B. Francis, “Choosing an Effective Protein Bioconjugation Strategy” *Nat. Chem. Biol.* **2011**, *7*, 876-884.
- P.G. Holder, D.T. Finley, **N. Stephanopoulos**, R. Walton, D.S. Clark, M.B. Francis, “Dramatic Thermal Stability of Virus-Polymer Conjugates in Hydrophobic Solvents” *Langmuir* **2010**, *26*, 17383–17388.
- **N. Stephanopoulos**, G.J. Tong, S.C. Hsiao, M.B. Francis, “Dual-Surface Modified Virus Capsids for Targeted Delivery of Photodynamic Agents to Cancer Cells” *ACS Nano* **2010**, *4*, 6014-6020.
- **N. Stephanopoulos\***, M. Liu\*, G.J. Tong, Z. Li, Y. Liu, H. Yan, M.B. Francis, “Immobilization and One-Dimensional Arrangement of Virus Capsids with Nanoscale Precision Using DNA Origami” *Nano Lett.* **2010**, *10*, 2714-2720.
- R.A. Miller, **N. Stephanopoulos**, J.M. McFarland, A.S. Rosko, P.L. Geissler, M.B. Francis, “The Impact of Assembly State on the Defect Tolerance of TMV-based Light Harvesting Arrays” *J. Am. Chem. Soc.* **2010**, *132*, 6068-6074.
- **N. Stephanopoulos**, Z.M. Carrico, M.B. Francis, “Nanoscale Integration of Sensitizing Chromophores and Porphyrins Using Bacteriophage MS2” *Angew. Chem. Int. Ed.* **2009**, *121*, 9662-9666.
- **N. Stephanopoulos**, E.O.P. Solis, G. Stephanopoulos, “Nanoscale process systems engineering: Toward molecular factories, synthetic cells, and adaptive devices” *AIChE J.* **2005**, *51*, 1858-1869.

## **INVITED CONFERENCE PRESENTATIONS AND SEMINARS**

- “Supramolecular polymerization of DNA-hybrid materials in one and three dimensions” ACS National Meeting; March 19, 2024
- “Supramolecular synthesis of functional polypeptide-DNA nanomaterials” ETH Zurich Department of Biosystems Science and Engineering, Basel, Switzerland; March 5, 2024
- “Hybrid, functional nanomaterials that integrate proteins/peptides and DNA” UT Austin; Feb. 8, 2024
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” Society for Biomaterials: Southwest Biomaterials Day; October 27, 2023
- “The Structure and Function of Hybrid Nucleic Acid-Polypeptide Nanomaterials” Gordon Research Conference on Peptide materials; January 18, 2023
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” UC Merced; April 29, 2022
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” U. Nebraska Medical Center; March 30, 2022
- “Integrating protein and peptide self-assembly with DNA nanotechnology” APS National Meeting, Chicago IL; March 14, 2022
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” UNSW, Sydney, Australia; *via Zoom*; Feb. 23, 2022
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” U. Michigan; Jan. 7, 2022

- “Hybrid Protein-DNA and Peptide-DNA Nanostructures” AIChE Meeting, Boston MA; November 9, 2021
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” U. Mass Amherst; Oct. 7, 2021
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” Frontiers in Global Science Seminar, Royal Scientific Society of Jordan; August 10, 2021 (*via Zoom due to Covid-19 pandemic*)
- “Supramolecular polymerization of DNA origami nanostructures with peptides, proteins, and small molecules” ACS National Meeting; April 9, 2021 (*online due to Covid-19 pandemic*)
- “Hybrid nanomaterials from proteins, peptides, and DNA” Institute of Physical Chemistry at University of Hamburg, Hamburg, Germany; January 26, 2021 (*via Zoom due to Covid-19 pandemic*)
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” Max Planck Institute for Polymer Research, Mainz, Germany; August 4, 2020 (*via Zoom due to Covid-19 pandemic*)
- “Protein-DNA nanotechnology” Institute for Protein Design, Seattle WA; March 12, 2020 (*via Zoom due to Covid-19 pandemic*)
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” California Institute of Technology, Pasadena CA; March 9, 2020
- “Rapid photo-actuation of a DNA nanostructure using an internal photocaged trigger strand” APS National Meeting, Denver CO; March 2, 2020 (*online due to Covid-19*)
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” Technische Universität München (Technical University of Munich), Munich, Germany; January 10, 2020
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” Fyzikální Ústav AV ČR, (FZU; Institute of Physics of the Czech Academy of Sciences), Prague, Czech Republic; January 7, 2020
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” Wyss Institute (Harvard University), Cambridge MA; December 2, 2019
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” Memorial Sloan-Kettering Cancer Center, New York NY; November 26, 2019
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” Johns Hopkins University, Baltimore MD; October 31, 2019
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” University of California, San Diego, San Diego CA; October 28, 2019
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” University of North Carolina at Chapel Hill, Chapel Hill NC; October 22, 2019
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” Institute for Molecular Engineering, Chicago IL; October 18, 2019
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” McGill University, Montreal Canada; October 1, 2019
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” The Ohio State University, Columbus OH; September 20, 2019
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge MA; September 13, 2019
- “Hybrid self-assembled nanomaterials from proteins, peptides, and DNA” Macromolecules Innovation Institute, Virginia Tech, Blacksburg VA; September 11, 2019
- “Hybrid peptide/protein-DNA nanomaterials for medicine and biology” 10th International Nanomedicine Conference, Sydney, Australia; June 24, 2019
- “Hybrid nanomaterials through the self-assembly of coiled-coil peptides and DNA nanostructures” ACS National Meeting, Orlando, FL; April 3, 2019
- “DNA nanoscaffolds for molecular machines, structures, and biomaterials,” ASU BME Seminar, Tempe AZ; October 12, 2018
- “Light-triggered self-assembly and actuation of DNA nanostructures using photocaged nucleotides,” ACS National Meeting, San Francisco CA; April 5, 2017

- “Peptide-DNA Hybrids for Dynamic, Programmable Control of Biomaterials,” ASU Molecular, Cellular, and Tissue Bioengineering (MCTB) Symposium, Tempe AZ; April 2, 2016
- “Instructing cells with programmable peptide-DNA extracellular matrices,” University of Science and Technology of China (USTC), Hefei, China; December 7, 2015

## **PRESS COVERAGE AND ARTICLES**

- **Press release for AFOSR Young Investigator Award:**  
<https://biodesign.asu.edu/news/asu-top-recipient-prestigious-air-force-young-investigator-awards>
- **ASU press release highlighting work in regenerative medicine:**  
<https://biodesign.asu.edu/news/restoring-loss-bio-inspired-materials-boost-regenerative-medicine>
- **Biodesign Institute article about publication and NSF CAREER Award:**  
<https://biodesign.asu.edu/news/useful-pinch-nanoscale-tweezers-are-triggered-light>
- **School of Molecular Sciences article about NSF CAREER Award:**  
<https://asunow.asu.edu/20180719-asu-molecular-sciences-professor-receives-nsf-career-award>
- **ASU article about NIH New Innovator Award:**  
<https://asunow.asu.edu/20181002-two-asu-professors-receive-2018-nih-new-innovator-award-0>
- **SMS article about research program:**  
<https://asunow.asu.edu/20190108-asu-assistant-professor-exemplifies-cutting-edge-molecular-science-research>
- **Biodesign article about tweezer sensor:**  
<https://biodesign.asu.edu/news/plucky-science-researchers%E2%80%99-nanotweezers-used-detection-conformational-changes>
- **ASU article about protein-DNA nano-cages:**  
<https://asunow.asu.edu/20190319-programmable-legos-dna-and-protein-building-blocks-create-novel-3d-cages>
- **Personal and research profiles on ASU’s “Ask A Biologist” website:**  
<https://askbiologist.asu.edu/explore/building-nanoscale>  
<https://askbiologist.asu.edu/explore/nanobiotechnology>
- **SMS article on faculty tenure in 2021:**  
<https://news.asu.edu/20210528-faculty-promotions-announced-school-molecular-sciences>
- **Article on the effect of Holliday junction sequence on DNA crystal assembly:**  
<https://www.sciencedaily.com/releases/2022/06/220629121054.htm>
- **Lawrence Berkeley Lab highlight on Holliday junction crystal work:**  
<https://als.lbl.gov/an-expanded-set-of-dna-building-blocks-for-3d-lattices/>
- **Article on student Bryan Ugaz winning the NSF GRFP fellowship:**  
<https://news.asu.edu/20230601-asu-student-receives-nsf-graduate-research-fellowship-dna-origami-research>

## **CURRENT AND PAST FUNDING**

- **NSF BMAT** – “Self-assembled DNA crystals as scaffolds for macromolecules” (PI: H. Yan; Co-PI: N. Stephanopoulos): \$499,999 (8/1/2023 – 7/31/2026)
- **NIH 1R01GM145916-01A1** – “Multivalent protein-DNA nanostructures as synthetic blocking antibodies” (PI: N. Stephanopoulos; Co-PI: P. Sulc): \$865,062 (7/1/2023 – 6/30/2026)
- **DOD-AFOSR** – “3D Nano-printing of protein nanostructures using DNA molds” (PI: N. Stephanopoulos): \$596,691 (7/1/2021 – 6/30/2024)

- **NIH DP2 (New Innovator Award)** – “Chemical synthesis of G protein-coupled receptors using sequential DNA-templated reactions” (PI: N. Stephanopoulos): \$2,230,906 (9/30/2018 – 5/31/2023)
- **DOD-AFOSR (Young Investigator Program)** – “Peptide-DNA Tiles as Building Blocks for the Synthesis of Complex Nanostructures” (PI: N. Stephanopoulos): \$359,541 (12/1/2016 – 11/30/2019)
- **NSF CAREER** – “Hybrid protein-DNA nanostructures and devices” (PI: N. Stephanopoulos): \$539,785 (7/1/2018 – 6/30/2023)
- **NIH R21** – “DNA Hyaluronic Acid Platform for Spatiotemporally Probing the Role of Adhesion Ligands and Growth Factors” (Co-PIs: J. Holloway, N. Stephanopoulos): \$347,738 (4/1/2019 - 1/31/2021)
- **NSF BMAT** – “Rational design of self-assembled, three-dimensional DNA crystals” (PIs: H. Yan; Co-PIs: N. Stephanopoulos, P. Sulc): \$450,000 (5/1/2020 - 4/30/2023)
- **NSF Elements** – “Models and tools for on-line design and simulations for DNA and RNA Nanotechnology” (PI: P. Sulc; Co-PIs: H. Yan, N. Stephanopoulos): \$436,407 (10/1/2019 - 9/30/2022)
- **Elsa U. Pardee Foundation** – “Synthetic Peptide-DNA Antibodies for Targeting Cancer Cells” (PI: N. Stephanopoulos): \$186,374 (1/1/2018 – 12/31/2018)
- **DOD-NAVY-ONR (DURIP instrument grant)** – “Mass Spectrometry Instrument for Mass Determination of Protein and Nucleic Acid Conjugates” (PI: H. Yan; Co-PIs: N. Stephanopoulos, J. Mills): \$300,000 (8/15/2016 - 8/14/2017)

## PATENTS

- **US patent No. 11,708,594** – “Reconfigurable DNA nano-tweezer”; Inventors: **N. Stephanopoulos**, M. Liu
- **US patent No. 11,547,997** – “Integrated diagnostic devices having embedded biomolecular computing systems and uses thereof”; Inventors: A.A. Green, M. Gilliam, K. Swingle, **N. Stephanopoulos**, N. Woodbury
- **US patent No. 11,789,029** – “Temporal Traumatic Brain Injury Biomarkers and Methods of Use Thereof”; Inventors: B. Martinez, S. Stabenfeldt, C. Diehnelt, **N. Stephanopoulos**, C. Willingham, A. Witten, K. Lundgreen
- **US patent No. 11,814,659** – “Tunable Nanoscale Cages from Self-Assembling DNA and Protein Building Blocks”; Inventors: **N. Stephanopoulos**, Y. Xu

## POSTDOCTORAL SCHOLARS & RESEARCH SCIENTISTS

- Dr. Minghui Liu (current Research Assistant Professor in group)
- Dr. Yang Xu (former Research Assistant Professor; co-advised with Prof. Hao Yan)
- Dr. Nour Eddine Fahmi (former Research Scientist co-advised with Prof. Hao Yan)

## GRADUATE STUDENTS MENTORED

- Tara MacCulloch (PhD, currently at Takeda Pharmaceuticals: <https://www.takeda.com/>)
- Alex Buchberger (PhD, currently at Nimble Therapeutics: <https://nimbletherapeutics.com/>)
- Raghu Pradeep Narayanan (PhD; co-advised with Prof. Hao Yan, currently postdoc at UCSF)
- Jonah Procyk (PhD; co-advised with Prof. Petr Šulc, currently at Novateur Research Solutions)
- Skylar Henry (PhD; co-advised with Prof. Karen Anderson, currently postdoc at Heath Futures Center)
- Julio Bernal (PhD; currently postdoc at UC Berkeley)
  - Awarded the 2023 Stanford PRISM award
- Md Al-Amin
- Alexandra Novacek
- Paul Workinger (joint PhD program with Caris Life Sciences)
- Abhay Prasad (co-advised with Prof. Hao Yan)
- Charitha Rajapakse (co-advised with Prof. Audrone Lapinaite)
- Xinyi Yu (co-advised with Prof. Hao Yan)
- Rong Zheng (co-advised with Prof. Hao Yan)
- Bryan Ugaz (co-advised with Prof. Jeremy Mills)



- Awarded the 2023 NSF GRFP fellowship
- Karen Baker
- Justin Brower

## **MASTERS STUDENTS MENTORED**

- Ryan Merkley (graduated 2016)
- Ann-Marie Aziz (graduated 2017)
- Timothy Griswold (graduated 2018)
- Omar Loza (graduated 2018)
- Brittany Torczynski (graduated 2019)
- Tyler Rockwood (graduated 2020)

## **UNDERGRADUATE STUDENTS MENTORED**

- Brittany Torczynski (stayed in lab for Masters)
- Will Tuli
- Matthew Nam
- Omar Loza (stayed in lab for Masters)
- Jonah Procyk (stayed in lab for PhD)
- Ilyssa Farmer
- Tyler Rockwood (stayed in lab for Masters)
- Rifat Adam Akkad
- Grant Severson
- Colton Seever
- Jessica Guido
- Anna Hostal
- Brooke Lovell
- Yash Gamoth
- Kaityln Cribbs
- Leif Lindberg
- Jonathan Chapman
- Eva Chen (awarded Dean's Medal by SMS)
- Justin Brower (stayed in lab for PhD)
- Tejit Miryala
- John Shin
- Bryan Le
- Vu Mai Thy Nguyen

## **MEMBER OF PHD THESIS COMMITTEE**

- Abhishek Debnath
- Swarup Dey
- Patrick Gleason
- Lan Zhu
- Soma Chaudhary
- Sanchari Saha
- Pritha Bisarad
- Subhadeep Dutta
- Towshif Rabbani
- Chang Liu

- Mahasish Shome
- Zina Al-Sahouri
- Roslyn Dermody (School of Life Sciences)
- Zaoqing Yan
- Justus Nwachukwu
- Thai Pham
- Fallon Fumasi (SEMTE, Chemical Engineering)
- Raymond Tindell (SEMTE, Chemical Engineering)
- Griffin McCutcheon
- Leeza Abraham
- Xiaoyu Chen
- Lu Yu
- Liangxiao Chen
- David Prieto (SBHSE, Biomedical Engineering)
- Yue Tang
- Erik Poppleton (SBHSE, Biological Design Program)
- Deeksha Satyabola
- Madeleine King
- Halima Khatun
- Lanshen Zhao
- Thong Diep
- Roman Fabry

## **SERVICE AND OUTREACH ACTIVITIES**

- Have served as reviewer for the following journals: *Nature Communications*, *Journal of the American Chemical Society*, *Biomacromolecules*, *Acta Biomaterialia*, *Nano Research*, *ACS Applied Materials & Interfaces*, *Nucleic Acids Research*, *Trends in Biochemical Sciences*, *Science Advances*, *Chem*, *Accounts of Chemical Research*, *Angewandte Chemie*, *International Journal of Molecular Sciences*, *Chemical Communications*, *Bioconjugate Chemistry*, *Scientific Reports*, *ACS Nano*, *Small*, *ChemBioChem*, *Trends in Biotechnology*, *Advanced Materials*, *Langmuir*; served as reviewer for an Elsevier textbook proposal on self-assembled materials and a book chapter for the Karty organic chemistry textbook.
- Chaired the “Molecular, Cellular, and Tissue Bioengineering Symposium”, a meeting at ASU covering various aspects of bioengineering, with speakers from both within and outside the university. My co-chair (Prof. Julianne Holloway) and I expanded the symposium from one day to two, and had ~100 students, postdocs, and faculty attendees
- Served on Committee for Undergraduate Education and Awards (since Fall 2016)
- Traveled to China for two weeks (Dec. 2015) to recruit talented students from top universities for the SMS PhD program. Made 20 offers, 5 of which were accepted
- Participated in Association of College and University Educators (ACUE) pilot program (Fall 2016) for more effective teaching techniques; one of two SMS representatives (and only junior faculty) chosen to evaluate the effectiveness of this program for future SMS participation
- Served on Goldwater Scholarship selection committee (Fall 2018)
- Served on departmental search committees for ASU:
  - Junior faculty candidate for bioengineering (SBHSE); Spring 2018
  - Junior faculty candidate in Chemical Engineering for SEMTE; Spring 2018
  - Senior faculty candidate for Director for the School of Molecular Sciences; Spring 2020
  - Junior faculty candidate for chemistry and biochemistry (SMS); Spring 2023
  - Junior faculty candidate for chemical engineering (SEMTE); Spring 2023
  - Lecturer in organic chemistry (SMS); Spring 2023

- Initiated outreach with Kyrene del Pueblo Middle School (Chandler) and taught basic concepts of DNA nanotechnology to 8th grade science class
- Working with Ask A Biologist initiative at ASU (<https://askbiologist.asu.edu/>) to develop an interactive game for K-12 students on DNA self-assembly, with concomitant teacher training workshop
- Volunteered as judge for the Intel Science and Engineering Fair (ISEF) in Phoenix (May 2016)
- Served as School of Molecular Sciences liaison to Regenerative Medicine Core at ASU (2020-2021)
- Served on grant review panels and forward-looking workshops:
  - NSF FDA panel (July 2018)
  - Ad hoc review for NSF FDA (July 2019)
  - NSF Square Table 2 workshop on the interface between synthetic biology and biomaterials science (Oct. 2019)
  - ARPA-E workshop (Dec. 2019)
  - Reviewed proposal for AFOSR Young Investigator Program (Aug. 2020)
  - Reviewed for DOE Biomolecular Materials Program (Feb. 2021)
  - Reviewed for the NSF DMR Program (March 2022)
  - Reviewed for the NIH EBIT Study Section (June 2023)
  - Reviewed for the NIH BBMT-M Study Section (November 2023)
- Served as member of ASU's Biological Design Graduate Program Steering Committee (from Fall 2020)
- Served as faculty advisor for HOSA – Future Health Professionals (from Fall 2020)
- Served as External Examiner for McGill Chemistry PhD thesis defense
- Served as External Examiner for FZU (Institute of Physics of the Czech Academy of Sciences) PhD thesis
- Guest Editor for special issue of *ACS Applied Bio Materials* (co-editor: Prof. Ronit Freeman), focusing on self-assembled peptide, protein, and DNA biomaterials