

Yevgeny Brudno

Associate Professor

Division of Pharmacoengineering and Molecular Pharmaceutics

Joint Department of Biomedical Engineering

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<https://pharmaco.bme.unc.edu/>

Education and Training

2011-2016 Technology Development Fellow,
Wyss Institute for Biologically Inspired Engineering, Harvard Medical School
Joint Advisors: David J Mooney, Michael Aizenberg.

Developed technologies for local delivery of therapeutic agents, including the first technology allowing for non-invasive replenishment of drug- and growth factor-releasing hydrogels and surfaces. In this technology, implanted hydrogels can be repeatedly refilled by capturing drugs and nanoparticles from the blood. This widely applicable platform technology allows for repeated, local and controlled release of therapeutic factors in a wide range of diseases and tissue engineered constructs, with translation potential in drug and cell delivery and regenerative medicine.

2010-2011 Postdoctoral Fellow,
School of Engineering and Applied Sciences, Harvard University
Advisor: David J Mooney

Demonstrated optimized growth factor release kinetics to enable endothelial and stromal cell responses during early angiogenesis and blood vessel maturation. Developed controlled-release systems to allow optimized temporal presentation of numerous growth factor which led to improved blood vessel growth, stromal cell recruitment and vascular remodeling.

2004-2010 Ph.D.
Department of Chemistry and Chemical Biology, Harvard University
Thesis Advisor: David R. Liu,

Developed methods for directed evolution of synthetic (non-biological) polymers. This technology allows for rapid synthesis and evolution-based screening of large libraries ($>10^8$) of monodisperse, sequence-defined synthetic polymers with biological and medical utility. The technology includes enzyme-free translation of nucleic acid code into sequence-defined unnatural polymers and for the directed evolution of these polymers toward useful applications. This advance was the first report of creating protein-like synthetic polymers and selecting for active versions of these polymers from large libraries of size $>10^8$ members.

2000-2004 BA *Magna Cum Laude*
Chemistry, University of Pennsylvania
Thesis Advisor: Jeffery D. Winkler

Studied stereoselective control of the [2+2] vinylogous amide photo-cycloaddition and discovered novel “inverse” reactivity motif leading to semi-stable cyclobutanes. This reaction was subsequently used in the total synthesis of Peduncularine.

1996-2000 Montgomery Blair High School

Professional Experience

2023-present Associate Professor

Division of Pharmacoengineering and Molecular Pharmaceutics
University of North Carolina at Chapel Hill

2023-present Joint Associate Professor,
Joint Department of Biomedical Engineering, Pharmacoengineering Program
University of North Carolina at Chapel Hill and North Carolina State University at Raleigh

2018-present Associate Faculty Member, Department of Molecular Biomedical Sciences
North Carolina State University at Raleigh

2017-present Associate Faculty Member, Department of Chemistry
North Carolina State University at Raleigh

2017-present
Member, Lineberger Comprehensive Cancer Center, UNC
Member, Center for Nanotechnology in Drug Delivery, Eshelman School of Pharmacy, UNC
Member, Comparative Medicine Institute, NC State
Member, Comparative Biomedical Sciences Graduate Program, NC State
Member, Nonwovens Institute
Member, Genetics and Genomics Academy

2017-2023 Joint Assistant Professor,
Joint Department of Biomedical Engineering, Pharmacoengineering Program
University of North Carolina at Chapel Hill and North Carolina State University at Raleigh

2017-2023 Adjunct Professor, Division of Pharmacoengineering and Molecular Pharmaceutics
Eshelman School of Pharmacy
University of North Carolina at Chapel Hill

Honors and Awards

2022 University Faculty Scholar

This program recognizes and rewards emerging academic leaders who demonstrate significant achievement.

Award is given to ~20 faculty each year at NC State.

2022 Goodnight Early Career Innovator Award

This award recognizes and rewards tenure-track assistant professors who demonstrate early productivity in STEM or STEM education research and innovation.

2022 NC State Outstanding Teacher Award

This award recognizes excellence in teaching and welcomes recipients as members of the Academy of Outstanding Teachers while they are NC State faculty members

2022 Alumni Outstanding Teacher Award

The Alumni Association selects a subset of Outstanding Teacher Award recipients for additional recognition.

2021 NCI MERIT Award

The R37 Method to Extend Research in Time (MERIT) award is a prestigious award designed to provide stable, long-term funding support to outstanding, experienced investigators whose productivity is distinctly superior and who are deemed highly likely to continue to perform their research activities in an outstanding manner.

2021 NC State Faculty Research Award

2019 NC State Faculty Research Award

2018 NC State Faculty Research Award

2018 UNC Junior Faculty Development Award

2015 2nd place award at the Massachusetts Life Science Innovation Day Startup Showcase

- 2011 Wyss Institute Fellowship
A PI-level, \$240,000 award providing salary and reagent support for three years of independent research to enable translational research with the opportunity to be mentored by both industry and academic members.
- 2008 Louis and Mary Fieser Award for Graduate Research
- 2005 Distinction in Teaching Award from Harvard University
- 2004 Scholastic Achievement Award from the American Chemical Society
- 2004 National Science Foundation Graduate Research Fellowship
- 2003 Hans S. Lukens Scholar Award for Excellence in Undergraduate Research
- 2002 Nassau Award for Excellence in Undergraduate Research
- 2002 Pfizer Corporation Research Undergraduate Summer Research Fellow
- 2002 Elected to the Philomathean Society of the University of Pennsylvania
- 2001 Elected to the University Scholars of the University of Pennsylvania

Publications

* denotes corresponding author

- Pandit S., Smith B.E., Birnbaum M.E., **Brudno Y.*** (2024) A biomaterial platform for T cell-specific gene delivery. *Acta Biomaterialia* (2024). *Acta Biomaterialia*. 15(177). 157-164
- Moody, C. T., Durham, P. G., Dayton, P. A., & **Brudno, Y.*** (2023). Loading intracranial drug-eluting reservoirs across the blood-brain barrier with focused ultrasound. *Ultrasound in Medicine & Biology*, 49(7), 1679–1685.
- VanBlunk, M., Srikanth, V., Pandit, S. S., Kuznetsov, A. V., & **Brudno, Y.*** (2023). Absorption rate governs cell transduction in dry macroporous scaffolds. *Biomaterials Science*, 11(7), 2372–2382.
<https://doi.org/10.1039/d2bm01753a>
- Agarwalla, P., Ogunnaike, E. A., Ahn, S., Froehlich, K. A., Jansson, A., Ligler, F. S., Dotti, G., & **Brudno, Y.*** (2022). Bioinstructive implantable scaffolds for rapid in vivo manufacture and release of CAR-T cells. *Nature Biotechnology*, 40(8), 1250–1258. <https://doi.org/10.1038/s41587-022-01245-x>
This work was featured in >20 news stories, including in: NC State News release, WRAL Techwire, Science Magazine, Medscape, Genetic engineering and Biotechnology News. This publication had 347 tweets on Twitter from 285 users, with an upper bound of 849,504 followers. This publication is cited three times in Wikipedia articles.
- Moody, C. T., Brown, A. E., Massaro, N. P., Patel, A. S., Agarwalla, P. A., Simpson, A. M., Brown, A. C., Zheng, H., Pierce, J. G., & **Brudno, Y.*** (2022). Restoring Carboxylates on Highly Modified Alginates Improves Gelation, Tissue Retention and Systemic Capture. *Acta Biomaterialia*, 138, 208–217.
<https://doi.org/10.1016/j.actbio.2021.10.046>
- Pandit, S., Palvai, S., Massaro, N. P., Pierce, J. G., & **Brudno, Y.*** (2022). Tissue-reactive drugs enable materials-free local depots. *Journal of Controlled Release: Official Journal of the Controlled Release Society*, 343, 142–151.
<https://doi.org/10.1016/j.jconrel.2022.01.023>
- VanBlunk, M., Agarwalla, P., Pandit, S., & **Brudno, Y.*** (2022). Fabrication and Use of Dry Macroporous Alginate Scaffolds for Viral Transduction of T Cells. *Journal of Visualized Experiments: JoVE*, 187.
<https://doi.org/10.3791/64036>
- Palvai, S., Moody, C. T., Pandit, S., & **Brudno, Y.*** (2021). On-Demand Drug Release from Click-Refillable Drug Depots. *Molecular Pharmaceutics*, 18(10), 3920–3925. <https://doi.org/10.1021/acs.molpharmaceut.1c00535>
- Adams, M. R., Moody, C. T., Sollinger, J. L., & **Brudno, Y.*** (2020). Extracellular-Matrix-Anchored Click Motifs for Specific Tissue Targeting. *Molecular Pharmaceutics*, 17(2), 392–403.
<https://doi.org/10.1021/acs.molpharmaceut.9b00589>
- Agarwalla, P., Ogunnaike, E. A., Ahn, S., Ligler, F. S., Dotti, G., & **Brudno, Y.*** (2020). Scaffold-Mediated Static Transduction of T Cells for CAR-T Cell Therapy. *Advanced Healthcare Materials*, 9(14), e2000275.
<https://doi.org/10.1002/adhm.202000275>

11. McNamara, S. L., **Brudno, Y.**, Miller, A. B., Ham, H. O., Aizenberg, M., Chaikof, E. L., & Mooney, D. J. (2020). Regenerating antithrombotic surfaces through nucleic acid displacement. *ACS Biomaterials Science & Engineering*, 6(4), 2159–2166. <https://doi.org/10.1021/acsbiomaterials.0c00038>
12. Moody, C. T., Palvai, S., & **Brudno, Y.*** (2020). Click cross-linking improves retention and targeting of refillable alginate depots. *Acta Biomaterialia*, 112, 112–121. <https://doi.org/10.1016/j.actbio.2020.05.033>
13. Palvai, S., Bhangu, J., Akgun, B., Moody, C. T., Hall, D. G., & **Brudno, Y.*** (2020). In Vivo Targeting Using Arylboronate/Nopoldiol Click Conjugation. *Bioconjugate Chemistry*, 31(10), 2288–2292. <https://doi.org/10.1021/acs.bioconjchem.0c00453>
14. Wang, H., Sobral, M. C., Snyder, T., **Brudno, Y.**, Gorantla, V. S., & Mooney, D. J. (2020). Clickable, acid labile immunosuppressive prodrugs for in vivo targeting. *Biomaterials Science*, 8(1), 266–277. <https://doi.org/10.1039/c9bm01487j>
15. Su, T., Huang, K., Ma, H., Liang, H., Dinh, P.-U., Chen, J., Shen, D., Allen, T. A., Qiao, L., Li, Z., Hu, S., Cores, J., Frame, B. N., Young, A. T., Yin, Q., Liu, J., Qian, L., Caranasos, T. G., **Brudno, Y.**, ... Cheng, K. (2019). Platelet-Inspired Nanocells for Targeted Heart Repair After Ischemia/Reperfusion Injury. *Advanced Functional Materials*, 29(4). <https://doi.org/10.1002/adfm.201803567>
16. **Brudno, Y.**, Pezone, M. J., Snyder, T. K., Uzun, O., Moody, C. T., Aizenberg, M., & Mooney, D. J. (2018). Replenishable drug depot to combat post-resection cancer recurrence. *Biomaterials*, 178, 373–382.
17. **Brudno, Y.**, Desai, R. M., Kwee, B. J., Joshi, N. S., Aizenberg, M., & Mooney, D. J. (2015). In vivo targeting through click chemistry. *ChemMedChem*, 10(4), 617–620.
18. **Brudno, Y.**, & Mooney, D. J. (2015). On-demand drug delivery from local depots. *Journal of Controlled Release: Official Journal of the Controlled Release Society*, 219, 8–17.
19. Maione, A. G., **Brudno, Y.**, Stojadinovic, O., Park, L. K., Smith, A., Tellechea, A., Leal, E. C., Kearney, C. J., Veves, A., Tomic-Canic, M., Mooney, D. J., & Garlick, J. A. (2015). Three-dimensional human tissue models that incorporate diabetic foot ulcer-derived fibroblasts Mimic In Vivo Features of chronic wounds. *Tissue Engineering. Part C, Methods*, 21(5), 499–508.
20. **Brudno, Y.**, Silva, E. A., Kearney, C. J., Lewin, S. A., Miller, A., Martinick, K. D., Aizenberg, M., & Mooney, D. J. (2014). Refilling drug delivery depots through the blood. *Proc National Acad Sci*, 111(35), 12722–12727.
This work was featured as an Editor's Choice in Science. This work was featured in a Science and Technology Concentrate in C&E News. This work was featured in a feature on Medical Research News in MedicalXpress. This work was featured as a News and Views article in Nature Nanotechnology. This work was featured in the News and Analysis section in the Materials Research Society Bulletin. This work was featured as a Research Highlight in Nature Reviews Drug Discovery
21. Roche, E. T., Hastings, C. L., Lewin, S. A., Shvartsman, D. E., **Brudno, Y.**, Vasilyev, N. V., O'Brien, F. J., Walsh, C. J., Duffy, G. P., & Mooney, D. J. (2014). Comparison of biomaterial delivery vehicles for improving acute retention of stem cells in the infarcted heart. *Biomaterials*, 35(25), 6850–6858.
22. Shvartsman, D., Storie-White, H., Lee, K., Kearney, C., **Brudno, Y.**, Ho, N., Cezar, C., McCann, C., Anderson, E., Koullias, J., Tapia, J. C., Vandenberg, H., Lichtman, J. W., & Mooney, D. J. (2014). Sustained delivery of VEGF maintains innervation and promotes reperfusion in ischemic skeletal muscles via NGF/GDNF signaling. *Molecular Therapy: The Journal of the American Society of Gene Therapy*, 22(7), 1243–1253.
23. **Brudno, Y.**, B, E.-S. A., Chen, R. R., Aizenberg, M., & Mooney, D. J. (2013). Enhancing microvascular formation and vessel maturation through temporal control over multiple pro-angiogenic and pro-maturation factors. *Biomaterials*, 34(36), 9201–9209.
24. Shamis, Y., Silva, E. A., Hewitt, K. J., **Brudno, Y.**, Levenberg, S., Mooney, D. J., & Garlick, J. A. (2013). Fibroblasts derived from human pluripotent stem cells activate angiogenic responses in vitro and in vivo. *PLoS One*, 8(12), e83755.
25. Pastor, W. A., Pape, U. J., Huang, Y., Henderson, H. R., Lister, R., Ko, M., McLoughlin, E. M., **Brudno, Y.**, Mahapatra, S., Kapranov, P., Tahiliani, M., Daley, G. Q., Liu, X. S., Ecker, J. R., Milos, P. M., Agarwal, S., & Rao, A. (2011). Genome-wide mapping of 5-hydroxymethylcytosine in embryonic stem cells. *Nature*, 473(7347), 394–397.
26. **Brudno, Y.**, Birnbaum, M. E., Kleiner, R. E., & Liu, D. R. (2010). An in vitro translation, selection and amplification system for peptide nucleic acids. *Nature Chemical Biology*, 6(2), 148–155.

27. **Brudno, Y.**, & Liu, D. R. (2009). Recent progress toward the templated synthesis and directed evolution of sequence-defined synthetic polymers. *Chemistry & Biology*, 16(3), 265–276.
28. Tahiliani, M., Koh, K. P., Shen, Y., Pastor, W. A., Bandukwala, H., **Brudno, Y.**, Agarwal, S., Iyer, L. M., Liu, D. R., Aravind, L., & Rao, A. (2009). Conversion of 5-methylcytosine to 5-hydroxymethylcytosine in mammalian DNA by MLL partner TET1. *Science*, 324(5929), 930–935.
29. Kleiner, R. E., **Brudno, Y.**, Birnbaum, M. E., & Liu, D. R. (2008). DNA-templated polymerization of side-chain-functionalized peptide nucleic acid aldehydes. *Journal of the American Chemical Society*, 130(14), 4646–4659.

Conference and Institutional Seminars

‡ denotes invited talk

1. ‡ “Biomaterials to Enable Rapid, Inexpensive and Potent CAR T Cell Therapy.” Inceptor Bio. Cary, NC, 2024.
2. ‡ “Biomaterials to Enable Rapid, Inexpensive and Potent CAR T Cell Therapy.” Mass General Hospital. Cambridge, MA, 2024.
3. ‡ “Biomaterials to Enable Rapid, Inexpensive and Potent CAR T Cell Therapy.” Imperial College. London, UK. February, 2024.
4. ‡ “Implantable CAR T Cell Factories “ Immunoengineering Gordon Conference. Lucca, Italy. February, 2024.
5. ‡ “Dismantling Barriers to Drug and Cellular Delivery.” Duke University. Durham, NC. November, 2023.
6. ‡ “Biomaterials for CAR T Cell Therapy.” Columbia University. New York, NY. *Virtual*. November, 2023.
7. ‡ “Biomaterials to Enable Rapid, Inexpensive and Potent CAR T Cell Therapy.” Lineberger Cancer Center. University of North Carolina – Chapel Hill, NC. October, 2023.
8. ‡ “Revolutionizing Cellular Therapies ” Triangle Venture Day. Raleigh, NC. September, 2023.
9. ‡ “Biomaterials to Enable Rapid, Inexpensive and Potent CAR T Cell Therapy ” Takara Bio - Japan. Virtual. September, 2023.
10. ‡ “Biomaterials to Enable Rapid, Inexpensive and Potent CAR T Cell Therapy ” Food and Drug Administration Seminar. Washington, DC. August, 2023.
11. “Biomaterials Strategies to CAR-T cell therapy ” North Carolina State University. Raleigh, NC. June, 2023.
12. ‡ “Biomaterial Strategies for Cellular Reprogramming and Single-Day CAR T Cell Production” Novartis. Boston, MA. March, 2023.
13. ‡ “Using Ultrasound to Replenish Intracranial Drug-Delivery Devices” World Congress of Society for Brain Mapping and Therapeutics. Los Angeles, CA. February, 2023.
14. ‡ “Biomaterial Cell Factories for Point-of-Care CAR T Cell Therapy” BioMan Summit. Boston, MA. December, 2022.
15. ‡ “Biomaterial Solutions for Refillable Drug Depots and CAR T Cells Manufacturing” University of Toronto. Toronto, Ontario. Canada. November, 2022.
16. ‡ “Click-chemistry to replenish drug delivery devices in live animals.” SERMACs. San Juan, Puerto Rico. October, 2022.
17. ‡ “Biomaterials Strategies for CAR-T cell therapy” Global Gene Therapy Initiative. Virtual. October, 2022.
18. ‡ “Biomaterials Strategies for CAR-T cell therapy” Duke University. Durham, NC. November, 2022.
19. ‡ "Dismantling Barriers to Drug and Cellular Delivery" University of Texas at Austin. Austin, TX. April, 2022.
20. ‡ "Dismantling Barriers to Drug and Cellular Delivery" Johns Hopkins University. Baltimore, MD. April, 2022.
21. “Dismantling Barriers to Drug and Cellular Delivery” Society for Biomaterials. Baltimore, MD. April, 2022.
22. ‡ "Biomaterials Strategies to CAR-T Cell Therapy" Centre for Translational Stem Cell Biology, Hong King University. Hong Kong. April, 2022.
23. ‡ "Dismantling Barriers to Drug and Cellular Delivery" University of Michigan - Ann Arbor. Ann Arbor, MI. April, 2022.
24. ‡ "Dismantling Barriers to Drug and Cellular Delivery for Cancer and Other Diseases " University of Massachusetts - Amherst. Amherst, MA. April, 2022.

25. ‡ "Dismantling Barriers to Drug and Cellular Delivery for Cancer and Other Diseases " University Notre Dame, South Bend, OH. March, 2022.
26. ‡ "Biomaterials for Cheaper, Faster, and More Potent CAR-T Cell Therapy" Comparative Medicine Institute Annual Retreat. Virtual. August, 2021.
27. "Delivery of Drugs and Cells to Tumors: Improving Efficacy and Reducing Toxicity of Chemotherapy and CAR-T Cell Therapy" College of Veterinary Medicine. NC State. Virtual. August, 2021.
28. "Noninvasively Refilling Drug-Eluting Depots" Controlled Release Society. Virtual. June, 2021.
29. "Noninvasively Refilling Drug-Eluting Depots" World Biomaterials Congress. Virtual. December, 2020.
30. ‡ "Noninvasively Refilling Drug-Eluting Depots" Controlled Release Society – Italy Chapter. Seminar Series. Virtual. October, 2020.
31. "Noninvasively Refilling Drug-Eluting Depots" Annual Meeting of the Biomedical Engineering Society. Virtual. October, 2020.
32. "Biomaterial Strategies for CAR-T Cell Manufacturing and Therapeutics" Annual Meeting of the Biomedical Engineering Society. Virtual. October, 2020.
33. ‡ "Chemical Biology Approaches for Targeting Drugs to Cancer and the Brain" Chemistry Departmental Seminar. North Carolina State University. Virtual. September, 2020.
34. "Noninvasively Refilling Drug-Eluting Depots" Annual Meeting of the American Chemical Society. Virtual August, 2020.
35. ‡ "Noninvasively Refilling Drug-Eluting Depots" Rising Stars Seminar Series. University of North Carolina at Chapel Hill. Virtual. July, 2020.
36. ‡ "Is the Smartest Material No Material at All?" Next Generation Smart Materials. Savannah, GA. December, 2019.
37. ‡ "Chemical Biology Approaches for Targeting Drugs to Cancer and the Brain" University of North Carolina. Chapel Hill, NC. October, 2019.
38. "Non-invasive Refilling of Therapeutic Depots" Targeted Delivery to the Tumor Microenvironment Workshop. Chapel Hill. NC. October, 2019.
39. ‡ "How to get drugs to a tumor, the whole tumor, and nothing but the tumor" RTP 180. Durham, NC. September, 2019.
40. "Noninvasive Refilling of Drug-Eluting Depots for Cancer Treatment" Annual Meeting of the Controlled Release Society. Valencia, Spain. July, 2019.
41. ‡ "Noninvasive Refilling of Therapeutic Depots" Royal College of Surgeons in Ireland. Dublin, Ireland. May, 2019.
42. "Noninvasive Refilling of Drug-Eluting Depots for Cancer Treatment" Annual Meeting of the Society for Biomaterials. Seattle, WA. April, 2019.
43. "Noninvasive Refilling of Drug-Eluting Depots for Cancer Treatment" Annual Meeting of the Biomedical Engineering Society. Atlanta, GA. October, 2018.
44. "Using Nucleic Acids to Target Nanoparticles to Drug-Eluting Gel for Local Drug Release" Annual Meeting of the Biomedical Engineering Society. Atlanta, GA. October, 2018.
45. ‡ "Non-Invasive Refilling of Therapeutic Depots" Annual Retreat of the Lineberger Cancer Center. Chapel Hill, NC. June, 2020.
46. ‡ "Non-Invasive Refilling of Therapeutic Depots" 2nd Nagoya – UNC/NCSU Research Collaboration Seminar. Nagoya, Japan. April, 2018.
47. "Refilling Drug-Eluting Depots through Systemic Administration of Inert Prodrugs" Annual Meeting of the Society for Biomaterials Meeting. Atlanta, GA. April, 2018.
48. "Using Nucleic Acids to Target Nanoparticles to Drug-Eluting Gels for Local Drug Release" Society for Biomaterials Meeting. Atlanta, GA. April, 2018.
49. "Non-Invasive Refilling of Therapeutic Depots" Biomedical Engineering Society Meeting. Phoenix, AZ. October, 2017.
50. "Non-Invasive Refilling of Therapeutic Depots" Annual Meeting of the American Chemical Society. Washington, DC. August, 2017.

51. ‡ “Non-Invasive Refilling of Therapeutic Depots” University of North Carolina – School of Pharmacy, Chapel Hill, NC. January, 2017
52. “Refilling Drug-Eluting Hydrogels through Systemic Administration of Inert Prodrugs” Materials Research Society. Boston, MA. November, 2016.
53. “Noninvasively refilling drug-releasing depots deep in the body.” Annual Meeting of the American Chemical Society. Philadelphia, PA. August, 2016.
54. ‡ “Controlled Drug Release and Refilling of Therapeutic Depots: Applications in Ischemia and Cancer” University of Wisconsin, Madison, WI. May, 2016.
55. ‡ “Controlled Drug Release and Refilling of Therapeutic Depots: Applications in Ischemia and Cancer” University of Maine, Orono, ME. April, 2016.
56. ‡ “Controlled Drug Release and Refilling of Therapeutic Depots: Applications in Ischemia and Cancer” University of North Carolina, Chapel Hill and North Carolina State University, Raleigh NC. February, 2016.
57. ‡ “Controlled Drug Release and Refilling of Therapeutic Depots: Applications in Ischemia and Cancer” Dartmouth College, Hanover, NH. February, 2016.
58. ‡ “Controlled Drug Release and Refilling of Therapeutic Depots: Applications in Ischemia and Cancer” Johns Hopkins University, Baltimore, MD. February, 2016.
59. ‡ “Controlled Drug Release and Refilling of Therapeutic Depots: Applications in Ischemia and Cancer” Rice University, Houston, TX. February, 2016.
60. ‡ “Using DNA Self-Assembly to Discover Novel Functional Polymers and Create Refillable Drug Delivery Devices” Washington University, St Louis. St Louis, MO. February, 2015.
61. ‡ "Harnessing DNA Self-Assembly to Discover Novel Functional Polymers and Create Refillable Drug Delivery Devices" University of Toronto. Toronto, Ontario. October, 2014.
62. ‡ "Refilling intra-tumor drug depots through the blood for cancer therapy" Dana Farber Cancer Center. Boston, MA. April, 2014
63. “Directed Evolution of Unnatural Polymers” Annual Meeting of the American Chemical Society. New Orleans, LA. April, 2013.
64. ‡ “Temporal Control Over Multiple Pro-Angiogenic And Pro-Maturation Factors Enhances Microvascular Formation and Vessel Maturation” Gordon Research Seminar - Biomaterials and Tissue Engineering. Holderness, NH. July, 2013.
65. “Evolution of Synthetic Polymers” Topics in Bioengineering Lecture Series, Harvard University. Cambridge, MA. September, 2010.
66. “An In Vitro Selection System for Peptide Nucleic Acids” Gordon Research Seminar – Polymers. South Hadley, MA. June, 2009.
67. “A System for the Iterative Selection of Functional Peptide Nucleic Acids” Feiser Award Lecture Series, Harvard University. Cambridge, MA. April, 2009.

Teaching Experience

For excellence in teaching, Dr. Brudno has received the Outstanding Teacher Award from North Carolina State University as well as the Alumni Outstanding Teacher Award from the NC State’s Alumni Association.

1. Fall 2023. BME 209: Introduction to the Materials Science of Biomaterials. # of students: 50.
2. Spring 2023. BME 506: Advanced Drug Delivery. # of students: 30. Rating: 4.8 / 5 (department mean (4.3)
3. Fall 2022. BME 209: Introduction to the Materials Science of Biomaterials. . # of students: 51. Overall Rating: 4.1 / 5 (department mean = 4.1)
4. Fall 2021. BME 209: Introduction to the Materials Science of Biomaterials. . # of students: 52. Overall Rating: N/A
5. Spring 2021. BME 590: Special Topics - Advanced Drug Delivery. # of students: 34. Overall Rating: 4.2 / 5 (department mean = 4.4)

6. Fall 2020. BME 209: Introduction to the Materials Science of Biomaterials. . # of students: 90. Overall Rating: N/A
7. Spring 2020. BME 590: Special Topics - Advanced Drug Delivery. # of students: 6. Overall Rating: N/A.
8. Fall 2019. BME 209: Introduction to the Materials Science of Biomaterials. . # of students: 51. Overall Rating: 4.5 / 5 (department mean = 4.1)
9. Spring 2019. BME 203: Introduction to the Materials Science of Biomaterials. . # of students: 53. Overall Rating: 4.2 / 5 (department mean = 3.8)
10. Spring 2019. BME 219: Laboratory Class for Introduction to the Materials Science of Biomaterials. # of students: 14. Overall Rating: 4.5 / 5 (department mean = 3.8)
11. Spring 2018. BME 203: Introduction to the Materials Science of Biomaterials. . # of students: 51. Overall Rating: 3.2 / 5 (department mean = 3.8)
12. Fall 2007. BS47. Small Molecules of Life. # of students: 120. Overall Rating: N/A.
13. Spring 2005. Chemistry 27. Organic Chemistry (TA). # of students: 16. Overall Rating: N/A.
14. Distinction in Teaching Award
15. Fall 2006. LS1A: An Integrated Introduction to the Life Sciences (TA). # of students: ~400. Overall Rating: N/A.
16. Fall 2004. Chemistry 51: Introduction to General Chemistry (TA). # of students: 18. Overall Rating: N/A.

Mentoring

Research Assistant Professors Mentored as PI:

Pritha Agarwalla (2021-present)

Postdoctoral Fellows Mentored as PI:

Vishal Shrikanth (2024-present)

Dimitra Apostolidou (2024-present)

Sharda Pandit (2023-present)

Christopher T Moody (2021-present)

Sandeep Palvai (2018-2020)

Pritha Agarwalla (2017-2021)

Graduate Students Mentored as PI

Emily Joe (2024-present)

Mabel Barreiro Carpio (2023-present)

Micah Mallory (2021-present)

Madelyn VanBlunk (2021-present)

Treyvon Davis (2022-present)

Rukesh Chinthapatla (2022-present)

Sharda Pandit, PhD (PhD, 2023), currently postdoctoral fellow at North Carolina State University

Christopher T Moody (PhD, 2021), currently postdoctoral fellow at North Carolina State University

Tiffany Ferrell (MS, 2021)

Mary R. Regan (MS, 2019), currently Operations Engineer at ACT Power Services

Justin Chen (MS, 2019), currently Scientist at Merck

Graduate Students Mentored During Training (2009-2015)

Dr. Ralph Kleiner. Current position: Assistant Professor at Princeton

Dr. Jia Niu. Current position: Assistant Professor at Boston University

Ryan Truby. Current position: Schmidt Science Fellow, MIT

Stephanie McNamara. Current position: student at Harvard University

Undergraduate Students Mentored as PI:

2023-present	Emma Grace Johnson, Candidate for B.S., Joint Dept. of Biomed. Eng., NC State/UNC-CH
2023-present	Nidhi Rane ¹ . Candidate for B.S., Chemical Engineering, NC State
2022-present	Belen Neumann-Rivera ⁴ . Candidate for B.S., Chemical Engineering, NC State
2022-present	Anna Isabel Castillo-Mayorga ⁵ . Candidate for B.S., Joint Dept. of Biomed. Eng., NC State/UNC-CH
2022-present	Hannah R Haynes. Candidate for B.S. Joint Dept. of Biomed. Eng., NC State/UNC-CH
2022-present	Dante Tomaino. Candidate for B.S., Joint Dept. of Biomed. Eng., NC State/UNC-CH
2022-present	Courtney Rogers ¹ . Candidate for B.S., Joint Dept. of Biomed. Eng., NC State/UNC-CH
2022-2023	Andrew Page. Candidate for B.S., Joint Dept. of Biomed. Eng., NC State/UNC-CH
2021-present	Nathanael Patton. Candidate for B.S., Joint Dept. of Biomed. Eng., NC State/UNC-CH
2020-2022	Bevin Neill ^{1,2,3} . B.S., Joint Dept. of Biomed. Eng., NC State/UNC-CH
2020-2022	April Brown ^{1,2,3} . B.S., Joint Dept. of Biomed. Eng., NC State/UNC-CH
2018-2019	Justin Park. B.S. Joint Dept. of Biomed. Eng., NC State/UNC-CH
2017-2019	Kristen Froehlich ^{1,3} . B.S., Joint Dept. of Biomed. Eng., NC State/UNC-CH
2017-2018	Arina Bartnicka. B.A, Biological Sciences NC State
2017-2018	Sabrina Earp ¹ . B.S., Joint Dept. of Biomed. Eng., NC State/UNC-CH

¹ Selected as Abram's Scholar; ² NCSU Office of Undergraduate Research Travel Award Recipient; ³ co-author on peer reviewed manuscript; ⁴Recipient of T34 award; ⁵Recipient of YSP/SIRI award

Undergraduate Students Mentored During Training (2005-2015)

Michael Birnbaum. Current position: Assistant Professor at MIT

Nan Du. Current position: Pediatric resident at Yale –New Haven Children's Hospital

Alex Miller. Current position: PhD student, MIT

Esmarine De Leon. Current position: Undergraduate student at University of Puerto Rico.

Intellectual Property

1. Agarwalla A, Dotti G, Moody CT. **Brudno Y**.
U.S. provisional patent application No. 63/584,409.
"Universal Transduction Systems, Compositions, and Methods."
2. Pandit S, Agarwalla A, Dotti G, **Brudno Y**
U.S. provisional patent application No. 63/415,806
"Implantable Materials for Generation and Release of Therapeutic Cells."
3. Pandit S, Agarwalla A, VanBlunk M, **Brudno Y**
U.S. patent application No. 63/441,409
"Methods of cell transduction in macroporous scaffolds."
4. Moody C, **Brudno Y**
U.S. patent application No. 63/288,906
"Chemical modification of alginate gels which do not interfere with crosslinking."
5. Pandit S, Palvai SK, Ferrell TR, Massaro NP, Pierce JG, **Brudno Y**.
U.S. patent application No. US 63/091,642
Worldwide patent No. PCT/US2019/053734
"Compositions and Methods for Drug Delivery"
6. Agarwalla P, Dotti G, **Brudno Y**.
U.S. patent application No. US 63/008,069 (2020)
Worldwide patent No. PCT/US2021/026805
Additional applications filed in: Canada, China, Europe, Japan.
"Enhanced Viral Transduction of Mammalian Cells Using Material Scaffolds"
7. Agarwalla P, **Brudno Y**.
U.S. patent application No. US 62/864,703 (2019)
Worldwide patent No. PCT/US2020/038386

Additional applications filed in: Europe, South Korea, Japan, China, India, Russia, and Brazil.

“In Situ Recruitment, Reprogramming, And Release Of CAR-T Cells”

8. Regan R, **Brudno Y.**

U.S. patent application No. US 17/281,025

Worldwide patent No. PCT/US2019/053734

"Compositions and Methods for Drug Delivery"

9. **Brudno Y**, Silva EA, Kearney CJ, Aizenberg M, Mooney DJ.

U.S. patent application No. US 2017 0119892 A1

Worldwide application No. WO2015154082A1

Japan application No. JP6787789B2

European No. EP3125866B1

Spain No. ES2871029T3

“Refillable drug delivery devices and procedures for their use”

10. **Brudno Y**, Silva EA, Kearney CJ, Aizenberg M, Mooney DJ.

Spain No. ES15773877T

“Rechargeable drug delivery devices and procedures for using them”

11. Liu DR, Rosenbaum DR, **Brudno Y.**

U.S. patent application no. US 11/916,710 (2006)

Worldwide application No. WO2006135654A3

“Polymer evolution via templated synthesis.”

Current and Completed Research Support

N/A	PI: Brudno		0.13 academic
NC Biotech Center		01/2023-01/2025	\$ 110,000.
“Implantable Bio Factories for Rapid and More Potent CAR T Cell Therapy.”			
This grant proposes work towards translation and commercialization of biomaterials for CAR T cell generation, including preclinical toxicity and biocompatibility studies.			
1R01CA278961	PIs: Brudno (contact), Agarwalla		1.2 summer
NIH / NCI		09/2023-08/2028	\$2,951,607.
“Bioinstructive Scaffolds for Potent and Affordable CAR-T Cell Therapy Against Brain Tumors.”			
This grant proposes to develop biomaterials for rapid and cost-effective manufacturing of CAR T cell against glioblastoma and other brain tumors.			
R33CA281875	PI: Brudno		1.66 summer
NIH / NCI		08/2023-07/2026	\$ 1,112,339.
“MASTER Scaffolds for Rapid, Single-Step Manufacture and Prototyping of CAR-T cells.”			
This grant proposes to develop technologies for single-day manufacturing of CAR T cells to enable academic and industrial research labs to rapidly prototype novel CAR T cell therapies.			
2020-2473 / Y20MTS0723	PI: Brudno (contact), Hess, Mariani		0.6 academic
Lineberger Cancer Center		07/2023-06/2025	\$ 100,000.
“Same-Day CAR T Cell Therapy for Dogs.”			
This grant proposes to develop rapid CAR T cell therapy for treatment of cancer in canine patients.			
2023-2231	PI: Brudno (contact), Agarwalla		0.47 academic
Chancellor’s Innovation Fund + 2ndF Foudation Supplement		07/2023-06/2024	\$ 96,500.
“Implantable CAR T Cell Factories.”			
This grant proposes toxicology and development activities to commercialize biomaterial scaffolds for CAR T cell therapy.			

R21CA277018 NIH / NCI	PI: Brudno	06/2023-05/2025	0.94 academic \$ 379,682.
“Biomaterial Scaffolds for In Vivo CAR T Cell Manufacture.” This grant proposes to develop technologies for entirely <i>in vivo</i> manufacture of CAR T cells against leukemia and lymphomas.			
N/A NC Biotech Center	PI: Kuznetsov, Brudno	03/2023-02/2024	0.13 academic \$ 20,000.
“Porous Materials to Transform Cellular Genetic Reprogramming.” This grant proposes to use biomaterials and computational techniques to study the mechanism underpinning biomaterial-mediated cellular transduction.			
2023-1593 NCSU RISF	PI: Kuznetsov, Brudno	02/2023-01/2024	0.13 academic \$ 25,000
“A Computational Investigation into the Inner Workings of Biomaterial Cell Factories.” This grant proposes computational models to understand the molecular basis for porous scaffold-mediated cell transduction with retroviruses.			
N/A NCSU / CMI Ideation	PI: Brudno, Mariani	08/2022-05/2023	0.1 academic \$ 47,500.
“A Canine Cancer Moonshot: Belka and Strelka for Canine CAR T Cells.” This grant proposes to develop technologies for rapid and cost-effective cellular immunotherapies targeting canine cancer.			
N/A NCSU / CMI Ideation	PI: Oh, Chinthapatla	08/2022-05/2023	0.0 academic \$ 22,500.
“Novel intratumoral paclitaxel chemotherapeutic “TRAPs” for equine squamous cell carcinomas.” This grant proposes to develop chemical modifications to chemotherapeutics so that they anchor in tumors for controlled release.			
N/A NCSU	PI: Brudno	07/2021-06/2024	0.09 academic \$ 66,000.
“Goodnight Scholar Career Innovator Award.” This award provides funding for Dr. Brudno to develop new translational technologies in bioengineering.			
N/A NCSU RISF	PI: Brudno, Cheng	02/2022-01/2023	0.09 academic \$ 31,250.
“Repairing Broken Hearts with Living Drugs.” This grant provides seed funding to explore CAR T cell therapy to treat cardiac ischemia and stroke.			
N/A NCSU RISF	PI: Hess, Brudno	02/2022-01/2023	0.09 academic \$ 31,250.
“Expanding the promise of CAR-T cell therapy to resource-poor healthcare settings.” This grant provides seed funding to develop biomaterial-mediated CAR T cell therapy for lower- and middle-income countries.			
N/A NCSU CMI-COL program	PI: Brown, Brudno	01/2022-05/2022	0.09 academic \$ 10,000.
“Stick and Click: A Combined Materials and Pharmacology Approach toward Synthetic Platelets” This grant provides seed funds to explore refillable platelet-like particles for targeting sites of tissue damage with therapeutic small molecules.			

N/A	PI: Brudno, Pierce, Oh		0.09 academic
NCSU CMI-COL program		01/2022-05/2022	\$ 10,000.
“TRAPS: Tissue-Reactive Anchoring of Pharmaceuticals”			
This grant provides seed funds to explore the use of anchoring pharmaceuticals for clinical treatment of equine squamous cell carcinoma.			
N/A	PI: Brudno		0.09 academic
NCSU CMI-FTE program		12/2021-05/2022	\$ 10,000.
“Scalable Manufacturing of CAR-T Cells: Living Drug Factories for Heart Repair”			
This grant provides seed funding to develop biomaterial that efficiently and sustainably release cellular therapeutics for the treatment of myocardial infarct.			
2022-2507	PI: Brudno		0.09 academic
NCSU FRPD		7/2022-06/2023	\$ 10,000.
“Hygroscoy-Driven Cell Transduction for CAR-T Cell Therapy”			
This proposal seeks insight into how material porosity and hygroscoy synergize with T-cell biology to mediate T-cell reprogramming in the absence of transduction promoters, spinoculation or pre-activation of T cells.			
2021-2983	PI: Brudno		0.09 academic
NCSU FRPD		7/2021-06/2022	\$ 8,000.
“A Simple, Materials-Free Injectable for Sustained Local Drug Release in Cancer.”			
This grant proposes to develop method for introducing biomaterials depots in stiff tumors through injection of activated ester molecules into target tissues that react with and anchor themselves to local extracellular matrix (ECM).			
2021-2983	PI: Stapleman (contact), Brudno		0.09 academic
UNC Lineberger		07/2021-06/2022	\$ 50,000.
“Non-Thermal Plasma Induced Immunogenic Cell Death in Pancreatic Cancer Cells”			
This grant proposes to investigate whether there is a correlation between specific short-lived RONS (•NO, •O, and •OH) and cellular responses related to immunogenic cell death <i>in vitro</i> in KPC 4662 pancreatic cancer cells.			
2021-2067	PI: Brudno (contact)		0.09 academic
Chancellor's Innovation Fund		07/2023-06/2024	\$ 50,000.
“Biomaterial Scaffolds to Transform Manufacturing of CAR-T Cells”			
This grant proposes work toward commercialization of biomaterial scaffolds for CAR-T therapy and describes improvements to the manufacture of biomaterial scaffolds, including development of standard operating procedures for scaffold synthesis, improved methods for biomaterial characterization and preliminary biocompatibility studies <i>in vivo</i> .			
R37CA260223	PI: Brudno (contact)		1.68 summer
NIH/NCI		04/2021-03/2026	\$ 1,943,109.
“Biomaterial Scaffolds for Ex Vivo and In Situ CAR-T Cell Production”			
This grant proposes to develop low-cost, tunable biomaterial scaffolds that improve both the Chimeric Antigen Receptor T (CAR-T) cell generation process and resulting CAR-T cell function. In this proposal we seek to define how alginate scaffolds with well-defined signaling factors and physical architecture influence the production and functional characteristics of CAR-T cells.			
N/A	PI: Brudno		0.09 academic
NCSU - CMI		10/2020-07/2021	\$ 2,500.
“Using Extracellular Matrix-Anchored Click Motifs to Target Stiff Unresectable Pancreatic Tumors”			
This proposal centers on developing refillable drug delivery devices for pancreatic tumors.			

AGT 5196 Oxford Biomedica	PI: Brudno	01/2021-07/2022	0.65 summer \$ 161,212.
“Exploring Oxford Biomedica (OXB) Lentiviral Vectors for in Situ Manufacturing of CAR-T Cells” [This project summary is confidential]			
R21CA246414 NIH / NCI	PI: Brudno (contact), Dayton	01/2019-01/2021	1.0 summer \$ 369,446.
“Image-guided, Ultrasound-enhanced Long-term Intracranial Drug Delivery” This grant is focused on a new treatment paradigm for Glioblastoma (GBM): refilling intracranial drug depots through the combination of non-toxic therapeutic prodrugs and transient ultrasound disruption of the blood brain barrier.			
N/A NCSU - CMI	PI: Schnabel(contact), Brudno	03/2020-05/2020	0.09 academic \$ 7,500.
“Refillable Depots to Combat Bacterial Biofilms in Infectious Arthritis.” This proposal centers on developing refillable drug delivery devices for treatment of equine arthritis			
N/A UNC TTSA	PI: Brudno	11/2019-03/2021	0.09 academic \$ 50,000.
“In Situ Recruitment, Reprogramming and Release of CAR-T Cells” This proposal centers on a novel method for transducing CAR-T cells and testing their activity in NSG mice.			
2019-FLG-3812 UNC TTSA	PI: Brudno	07/2019-04/2020	0.09 academic \$ 24,000.
“Biomaterial-Assisted In Situ Generation of CAR-T Cells” This grant proposes feasibility studies into a radical alternative where an implanted scaffold recruits, reprograms and releases CAR-T cells inside of patients - completely eliminating the external cell manipulation.			
2019-2557 UNC TTSA	PI: Brudno	07/2019-06/2020	0.13 academic \$ 10,000.
“Sustained and Specific Drug Delivery to the Brain” This grant proposes to combine refillable drug devices with BBB disruption in order to refill intracranial drug-eluting depot non-invasively in the brain.			
N/A UNC Junior Faculty Development Award	PI: Brudno	07/2019-06/2020	0.09 academic \$ 10,000.
“Refillable Therapeutic Depots for Treatment of Brain Disease” This central premise of this proposals is that long-term and repeated drug presentation in the brain without systemic side effects will be central to disease therapy.			
N/A NCSU	PI: Hess	06/2018-05/2019	0.09 academic \$ 10,000.
“Evaluation of next-generation adjuvants for development of a canine cancer vaccine” This grant poposes to test the hypothesis that established pattern recognition receptor ligands can activate canine dendritic cells.			
N/A NCSU – FRPD	PI: Brudno	06/2019-05/2020	0.09 academic \$ 10,000.
“Sustained and Specific Drug Delivery to the Brain” This grant provides seed funding to develop refillable drug-eluting depots which can be implanted into the brain, release drugs, and be repeatedly and non-invasively refilled.			

N/A	PI: Brudno		0.09 academic
NCSU – FRPD		06/2018-05/2019	\$ 16,000.
“Local Immunotherapy Made Possible by Click-Enabled Refillable Therapeutic Depots”			
This grant provides seed funding to explore refilling of drug delivery depots with immunotherapy ligands such as STING.			
Y20MTS0723	PI: Brudno		0.09 academic
UNC Lineberger		07/2020-06/2023	\$ 88,208.
“Viral Vector-loaded Macroporous Scaffold & Refilling Drug Depots”			
The focus of this grant is to develop unmodified viral vector-loaded macroporous scaffolds to encapsulate capable of generating CAR-T cells in situ for delivery.			
N/A	PI: Brudno		0.09 academic
UNC Lineberger		01/2018-12/2018	\$ 50,000.
“Targeting Glioblastoma Recurrence Through Focused Ultrasound-Enabled Refillable Drug Depots.”			
This grant provides funding to develop refillable drug-delivery devices for the intracranial treatment of glioblastoma.			
N/A	PI: Brudno		0.09 academic
NCTraCS		01/2018-12/2018	\$ 50,000.
“Targeting Glioblastoma Recurrence Through Focused Ultrasound-Enabled Refillable Drug Depots”			
This grant provides funding to develop refillable drug-delivery devices for the intracranial treatment of glioblastoma.			
N/A	PI: Brudno		12 academic
Wyss Institute for Biologically Inspired Engineering		10/2012-10/2016	\$ 300,000.
“Drugs that self-assemble inside of cells”			
This funding provides salary and research support to develop drugs that self-assemble inside of cells.			
N/A	PI: Brudno		12 academic
NSF GRFP		09/2005-09/2008	\$ 120,000.
NSF Graduate Research Fellowship in Chemical Biology			
This fellowship provided salary support for graduate studies in Chemical Biology.			

Service

Professional or National/International

2023	NIH Study Section: CIC Panel (ad hoc)
2022	NIH Study Section: ZRG1 OTC-T10 Panel (ad hoc)
2022-present	Member, Global Gene Therapy Initiative, CaringCross.
2021	DOD Study Section: SRDD Panel (ad hoc)
2021	NSF Study Section: BMAT Panel (ad hoc)
2021	NIH Study Section: ZRG1 OTC-V Panel (ad hoc)
2020	NIH Study Section: ZRG1 OTC- V Panel (ad hoc)
2019-present	Biomedical Engineering Society Abstract Reviewer – Biomaterials
2019-present	Biomedical Engineering Society Abstract Reviewer – Cancer Drug Delivery
2018	National Defense Science and Engineering Graduate (NDSEG) Fellowships
2020-2022	Chair. Bioinspired and Biomimetic Focus Group. Controlled Release Society
2018-2020	Secretary. Bioinspired and Biomimetic Focus Group. Controlled Release Society
2016-present	Member, Biomedical Engineering Society
2016-present	Member, Controlled Release Society
2018-present	Member, Society for Biomaterials
2010-present	Member, American Chemical Society

University / College

2023-present	Science Lead (Molecular Therapeutics) - Integrate Science Initiative
2021-present	Science Lead (Molecular Therapeutics) - Integrate Science Building
2021-present	Focus Group Lead - CLP Division of the Comparative Medicine Institute
2020-present	Executive Committee Member - Chemistry of Life Program. NC State University
2020-present	Executive Committee Member - Comparative Medicine Institute

Department

2020-present	Committee Member - Diversity Committee
2019-present	Committee Member - BME Abrams Scholars Selection Committee
2018	Committee Member - BME Lucas Scholars Selection Committee
2018	Committee Member - BME Faculty Search Committee
2018	Committee Member - BME Graduate Admissions Committee
2018	Committee Member - Retreat Planning Committee
2018	Committee Member - BME Graduate Admissions Committee
2017	Committee Member - BME Faculty Search Committee
2017	Committee Member - UNC FEE Committee

Journal Reviews

ACS Nano, ACS Applied Biomaterials, Acta Biomaterialia, Advanced Healthcare Materials, Advanced Materials, Advanced Science, Advanced Therapeutics, Analytical Chemistry, Biomaterials, Biomaterial Sciences, Chemical Communication, Drug Delivery, Drug Delivery and Translational Research, eLife, Frontiers Bioengineering, Frontiers Chemistry, Immuno-Oncology and Technology, Journal of Biomaterials, Journal of Controlled Release, Journal of Materials Chemistry B, Material Advances, Material Horizons, Molecular Therapeutics, MRS Advance, NanoLetters, Nanoscale, Nature Cancer, Nature Communications, Nature Reviews Bioengineering, Small, Open Life Sciences, Theranostics, Vaccines and Immunotherapy.