



Yevgeny Brudno
Wyss Institute for Biologically Inspired Engineering
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Education

2010 Ph.D. in Chemistry, Harvard University
2004 B.A. in Chemistry and Biophysics, *Magna Cum Laude*, University of Pennsylvania
2000 Montgomery Blair High School

Research Interests

Regenerative medicine and cell delivery, biomaterials, drug delivery, tissue engineering.
Chemical biology, bioorthogonal chemistry, nucleic acid and peptide therapeutics

Training

2011-present Technology Development Fellow, Wyss Institute for Biologically Inspired Engineering
Harvard Medical School

Developed refillable therapeutic depots for applications in drug delivery and regenerative medicine. This technology enables repeated systemic dosing to be translated into controlled, local presentation for improved cancer therapy, improved cell delivery and improved vascularization.

2010-2011 Post-doctoral fellow with David Mooney, School of Engineering and Applied Sciences
Harvard University

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. Research with David R. Liu, Department of Chemistry and Chemical Biology
Harvard University

Developed a method to rapidly synthesize and screen monodisperse, sequence-defined synthetic polymers with biological and medical utility. This advance was the first to report the creation of large libraries ($>10^8$) of protein-like synthetic polymers and for the evolution-like selection of these libraries for active molecules.

2002-2004 B.A. Research with Jeffrey D Winkler, Department of Chemistry,
University of Pennsylvania

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.

Awards

- 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:

Brudno Y, Miller A, McNamara S, Han H, Chaikof E, Mooney DJ. "Repeatedly replenishing catheter surfaces with anti-thrombotic agents" *in preparation*

Kwee B*, **Brudno Y***, Aizenberg M, Mooney DJ. "A covalent small-molecule alginate adduct improves wound healing in a hind-limb ischemia" *in preparation*

Brudno Y, Mooney DJ. "On-Demand Drug Delivery from Local Depots." *Journal of Controlled Release. In Press* (2015)

Brudno Y, Kwee B, Desai R, Aizenberg M, Mooney DJ. "In Vivo Targeting through Click Chemistry" *ChemMedChem*. 10(4): 617-620 (2015)

Maione AG, **Brudno Y**, Stojadinovic O, Park, LK, Smith, A, Tellechea A, Leal EC, Kearney C, Veves A, Tomic-Canic M, Mooney DJ, Garlick JA. "Three-dimensional human tissue models that incorporate diabetic foot ulcer-derived fibroblasts mimic in vivo features of chronic wounds." *Tissue Engineering*. 21(5): 499-508 (2015)

Brudno Y*, Silva EA*, Kearney CJ, Lewin S, Aizenberg M, Mooney DJ. "Refilling Drug Delivery Depots Through the Blood" *Proceedings of the National Academy of Science* 111(35): 12722-7 (2014)

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*

Shvartsman D, Storrie H, Lee K, Kearney CJ, **Brudno Y**, Ho N, Cezar CA, McCann CM, Anderson E, Koullias J, Tapia JC, Vandenburg HH, Lichtman JW, Mooney DJ. "Sustained Delivery Of VEGF Activates Re-innervation And Reperfusion In Ischemic Skeletal Muscles Via NGF/GDNF Signaling" *Molecular Therapy* 22(7):1243-53 (2014)

Roche ET, Hastings CL, Lewin SA, Shvartsman DE, **Brudno Y**, Vasilyev NV, O'Brien FJ, Walsh CJ, Duffy GP, Mooney DJ. "Biomaterial Delivery Vehicles Improve Acute Retention Of Mesenchymal Stem Cells In The Infarcted Heart" *Biomaterials* 35(25): 6850-8 (2014)

Brudno Y, Aizenberg M, Mooney DJ. "Pro-Angiogenic Factors Enhance Pericyte Function During Angiogenesis" *Proceedings of the Northeast Bioengineering Conference* (2014)

Shamis Y, Silva EA, Hewitt KJ, **Brudno Y**, Levenberg S, Mooney DJ, Garlick JA. "Fibroblasts Derived from Human Pluripotent Stem Cells Activate Angiogenic Responses In Vitro and In Vivo" *PLoS ONE* 8(12): e83755 (2013)

Brudno Y, Ennett AB, Chen R, Aizenberg M, Mooney DJ. "Enhancing microvascular formation and vessel maturation through temporal control over multiple pro-angiogenic and pro-maturation factors." *Biomaterials* 34(36): 9201-9209 (2013)

Pastor WA, Pape UJ, Huang Y, Henderson HR, Lister R, Ko M, McLoughlin EM, **Brudno Y**, Mahapatra S, Kapranov P, Tahiliani M, Daley GQ, Liu S, Ecker JR, Milos PM, Agarwal S, Rao A. "Genome-Wide Mapping Of 5-Hydroxymethylcytosine In Embryonic Stem Cells" *Nature* 473: 394-397 (2011)

Brudno Y, Birnbaum ME, Kleiner RE, Liu DR. "An In Vitro Translation, Selection, and Amplification System for Peptide Nucleic Acids" *Nature Chemical Biology* 6: 148-155 (2009).

This work was featured in a News and Views article in *Nature Chemical Biology* 6, 87-88 (2010), and was also featured in an article highlighting *Nature Chemical Biology* papers over the five-year history of the journal in *Nature Chemical Biology* 6, 387-389 (2010)

Tahiliani M, Koh KP, Shen Y, Pastor WA, Bandukwala H, **Brudno Y**, Agarwal S, Iyer LM, Liu DR, Aravind L, Rao A. "Conversion Of 5-Methylcytosine To 5-Hydroxymethylcytosine In Mammalian DNA By MLL Partner TET1" *Science* 324(5929): 930-935 (2009).

This work was featured in a Spotlight in *ACS Chemical Biology* 4, 315 (2009) and in a Research Highlight in *Nature* 458, 1080 (2009)

Brudno Y, Liu DR. "Recent Progress Toward The Templated Synthesis And Directed Evolution Of Sequence-Defined Synthetic Polymers" *Chemistry & Biology* 16(3): 265-276 (2009)

Kleiner RE, **Brudno Y**, Birnbaum ME, Liu DR. "DNA-Templated Polymerization of Side-Chain-Functionalized Peptide Nucleic Acid Aldehydes" *Journal of the American Chemical Society* 130 (14): 4646-4659 (2008)

Patents:

Liu DR, Rosenbaum DR, **Brudno Y**. "Polymer evolution via templated synthesis." U.S. patent application no. 11916710. (2006).

Brudno Y, Silva EA, Kearney CJ, Aizenberg M, Mooney DJ. "Refilling Drug Delivery Depots Through the Blood" (2014)

Invited Talks at Conferences and Institutional Lecture Series

"Using DNA Self-Assembly To Discover Novel Functional Polymers And Create Refillable Drug Delivery Devices"

Washington University, St Louis. St Louis, MO. 2015

"Harnessing DNA Self-Assembly To Discover Novel Functional Polymers And Create Refillable Drug Delivery Devices"

IBBME Special Lecture. Toronto, Ontario. 2014

"Refilling intra-tumor drug depots through the blood for cancer therapy"

Dana Farber Cancer Center. Boston, MA. 2014

"Directed Evolution Of Unnatural Polymers"

American Chemical Society Meeting. New Orleans, LA. 2013

"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. 2013

"Evolution of Synthetic Polymers"

Topics in Bioengineering Lecture Series, Harvard University. Cambridge, MA. 2010

"An *In Vitro* Selection System for Peptide Nucleic Acids"

Gordon Research Seminar – Polymers. South Hadley, MA. 2009

"A System for the Iterative Selection of Functional Peptide Nucleic Acids"

Feiser Award Lecture Series, Harvard University. Cambridge, MA. 2009

Teaching and Mentoring Experience

2007 Harvard BS47. Small Molecules of Life

2005 Harvard Chemistry 27. Organic Chemistry

Distinction in Teaching Award

2005 Harvard LS1A: An Integrated Introduction to the Life Sciences

2004 University of Pennsylvania Chemistry 51: Introduction to General Chemistry

Graduate Students Mentored: Ralph Kleiner (2006-2009), Jia Niu (2009-2010), Ryan Truby (2013-2014), Stephanie McNamara (2015).

Undergraduate students mentored: Michael Birnbaum (2005-2009), Nan Du (2010-2012), Alex Miller (2012-2014), Esmarine De Leon (2015).