Northeastern University
College of Engineering

Wednesday, February 19, 2025| 135 Shillman Hall | 12:00 PM
Distinguished Seminar Speaker

Making Oligonucleotides Better Medicines with Bottlebrush Polymers

Professor Ke Zhang Ph.D.
Department of Chemistry and Chemical Biology | Northeastern University

Abstract. Nucleic acids are programmable biomolecules that hold great promises as a therapeutic. However, with over 40 years of development, only a handful of nucleic acid drugs ever reached the market. The lack of greater success is in part due to the poor biopharmaceutical properties of naked nucleic acids, which require extensive chemical modification and/or the use of a carrier system. This presentation focuses on the development of a bottlebrush polymer system for improving the delivery of oligonucleotide-based genetic medicine. Termed Brushield (brush + shield), the delivery technology relies upon the three-dimensional arrangement of biologically benign polymer chains to enhance the pharmacological properties of the nucleic acids. The polymer provides the conjugated oligonucleotide steric selectivity towards complementary strands vs. proteins, which allows it to bypass many of the side effects associated with protein-DNA interactions and achieve bioactivity in a number of disease models.

Biography: Dr. Ke Zhang obtained his BS degree in 2005 in Applied Chemistry from Nanjing University of Technology, China. He then studied polymer chemistry with Prof. Karen Wooley at Washington University in St. Louis, focusing on shell-crosslinked knedel-like nanoparticles and gene delivery, obtaining a PhD degree in Chemistry in 2009. Thereafter, Dr. Zhang was a postdoctoral fellow in the laboratory of Prof. Chad Mirkin at Northwestern University to develop hollow spherical nucleic acids, a carrier-free platform for gene regulation. In 2012, Dr. Zhang joined Northeastern University as an Assistant Professor of Chemistry and was promoted to Associate in 2017 and to Full in 2022. His current research includes the design and synthesis of unique polymer superstructures, nucleic acid-polymer conjugates, and genetic nanomedicine. Dr. Zhang was recognized as a Kabiller Rising Star in Nanomedicine (2023), a Pioneering Investigator by *Polymer Chemistry* (2021), Emerging Investigator by *Journal of Materials Chemistry B* (2020), ACS PMSE Young Investigator (2018), *Nano Research* Young Innovator (2017), ACS PRF Doctoral New Investigator (2014), and by an NSF CAREER award (2014).

Department of Chemical Engineering
201Cullinane Hall
Northeastern University
360 Huntington Avenue
Boston, MA 02115