

Cationic Polymers for mRNA Delivery

Changkui Fu

Australian Institute for Bioengineering and Nanotechnology and ARC Centre of Excellence in Convergent Bio-Nano Science and Technology, The University of Queensland, St Lucia, Queensland, 4072, Australia

changkui.fu@uq.edu.au

The landmark success of messenger RNA (mRNA) vaccine for SARS-CoV-2 highlights the bright prospects of mRNA as a new therapeutic modality. In contrast to DNA, mRNA does not integrate into genomes and exerts its function in cytoplasm through expressing functional proteins. This confers mRNA minimized risk of insertional mutagenesis and high safety for various therapeutic applications. As a large, hydrophilic, and negatively charged macromolecule, mRNA has seen difficulty in crossing cell membrane and requires vectors to assist its delivery. Currently, a lot of efforts have been devoted to developing lipid nanoparticles for mRNA delivery. Polymers, on the other hand, receive less attention despite they show several distinct advantages such as tailorable chemical structure and functionality, controlled molecular weight and dispersity, and better stability compared to lipid nanoparticles. In this talk, I will present our recent results on developing cationic polymers for mRNA delivery and provide a particular insight into the chemical and structural effect of polymers on the delivery and transfection of mRNA.