

# **Nanoengineering Biomaterials: From Assembly to In Vivo Delivery and Function**

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Advances in nanoparticle-mediated therapeutic delivery are poised to revolutionize disease treatment and prevention. In particular, the formulation of mRNA into lipid nanoparticles to combat COVID-19 has highlighted the transformative potential of nanoparticle platforms in the pharmaceutical industry and clinical practice. However, distinct types of therapeutics are required to meet specific therapeutic purposes, and their encapsulation is typically tailored on a case-by-case basis. This presentation introduces a versatile, biomaterial-based nanoparticle platform capable of assembling diverse therapeutics—including functional small molecules, siRNA, mRNA, and proteins—into nanoparticles. The encapsulated therapeutics maintain their intrinsic activity and can be released upon exposure to the biological milieu. This nanoparticle platform holds potential for a range of applications.