Hijacking DNA Chemical Synthesis: Precision Oligomers for Supramolecular Chemistry and Drug Delivery

The chemistry of automated DNA synthesis allows the production of sequence-defined oligomers can to create monodisperse macromolecules with unrivaled precision over the sequence of monomers incorporated. Combining hydrophobic modifications with nucleic acids can create sequence-defined DNA amphiphiles that self-assemble in aqueous conditions into various 3D morphologies depending on the sequence of both blocks: micelles, nanofibers, nanosheets. In particular, spherical micelles – coined Spherical Nucleic Acids – with tunable stability can be used to efficiently deliver nucleic acid therapeutics (antisense oligonucleotides, siRNA, …).