Programmed Self-Assembly of RNA Molecules for Structural Determination

Di Liu[1]
[1]*Harvard University*
liudidna@gmail.com

Because of their well-defined helical features and predictable interactions, nucleic acid molecules are highly programmable materials for creating nanoscale objects. We have also engineered natural RNA molecules to construct self-assembled RNA structures with increased molecular weight and mitigated flexibility for the efficient cryo-EM structural determination. This nanoarchitectural engineering strategy enables the first sub-3 Å RNA- only cryo-EM structure. The similar principle has also been utilized for solving small flexible RNA motifs by X-ray crystallography. As a result, we have solved the structure of an artificially designed RNA branched kissing-loop motif, which has been utilized for constructing complex self-assembled RNA nanostructures. Our research manifests the utility of programming nucleic acids for solving fundamental biological problems.