

# Nature-inspired Polymer Synthesis

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About hundred years ago, Hermann Staudinger published his “Macromolecular Manifesto” and demonstrated the existence of macromolecules. Today, polymer chemistry still provides a rich research area with many synthetic challenges that still need to be solved to create materials with entirely novel functions. In comparison to natural biopolymers such as proteins, peptides, carbohydrates, or DNA that represent the central framework of all biological processes in Nature, synthetic polymers lack precisely defined backbones, distinct monomer sequences of natural diversity that program shapes, 3D architectures and supramolecular assemblies, which is a prerequisite for achieving rich activities of biopolymers. Taking inspiration from Nature, novel synthetic procedures are developed to prepare polymeric architectures with structural complexity and precision. Such macromolecules are designed to resemble and interfere with natural biopolymers and they provide new opportunities for generating polymer therapeutics.

Our approaches to solving such challenges will be presented first focusing on the synthesis of precision polymeric architectures based on body’s own biomaterials as templates and scaffolds. The synergistic combination of polymer chemistry and protein or DNA research provides hybrid macromolecules of high structure definition that guides their interactions with proteins, viruses and cells in a controlled fashion thereby modulating vital cellular processes.

## References

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