Biotemplated Polymer Synthesis

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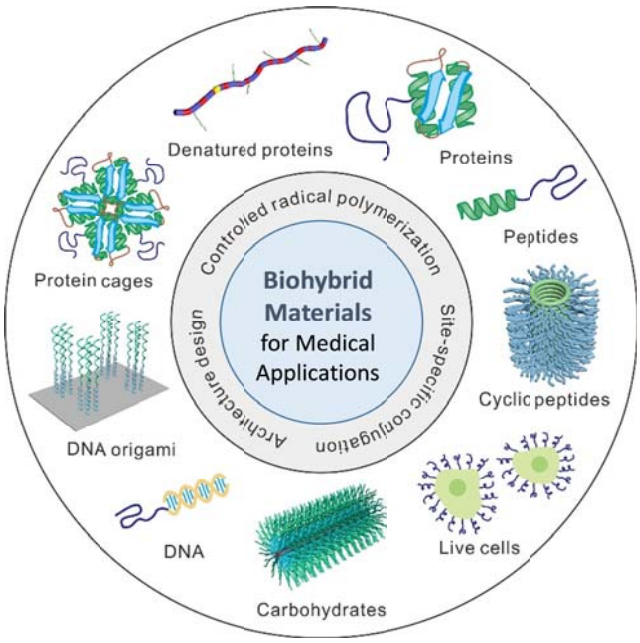
Macromolecular chemistry provides a rich research area with many synthetic challenges that still need to be solved to create materials with entirely novel functions. The implementation of distinct sequences, defined lengths and precisely controlled 3D shapes and architectures is emerging and there has been great progress recently. Our approaches to solving such challenges will be presented first focusing on the synthesis of polymer bioconjugates by combining synthetic polymers with nature's biomaterials such as peptides, proteins and nucleic acids as templates and scaffolds. By applying i.e. biocatalysts under air and in aqueous media, distinct biohybrid structures are obtained such as polymer brushes with defined sequences and precise backbones or photo-controlled polydopamine nanostructures with defined shapes. The combination of DNA origami templates and polymer synthesis affords "polymer origami" nanostructures with defined dimensions and shapes that provide access to sophisticated nanocatalysts or drug transporters. In this way, multifunctional biohybrid materials are achieved and applied for solving current challenges in medicine.



Overview over different polymer bioconjugates