Sequence-defined polymers – a step forward to bridge the gap between natural and synthetic macromolecules

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The natural, perfectly sequence-defined macromolecules such as proteins and DNA for years have been an inspiration for polymer chemists. To this day, we are charmed by protein`s three dimensional, precisely folded structures and the functions they can perform. Recently, the synthesis yielding polymers with precise monomer sequence has become a very important topic in modern polymer science.[1] The polymer chemists reached for tools from other disciplines like organic chemistry or biochemistry and implied them to the classical approaches.[2] The imported methodologies allowed the development of many new strategies leading to defined macromolecules.[3] The examples of synthesis yielding sequence-defined macromolecules[4] and the sequence influence on the properties of resulting materials will be presented. Moreover, the control over the assembly of defined polymer chains into functional materials using non-covalent synthesis approaches based on electrostatic interactions will be discussed.[5] The application`s potential of such materials will be illustrated on the example of data storage applications (Fig. 1).

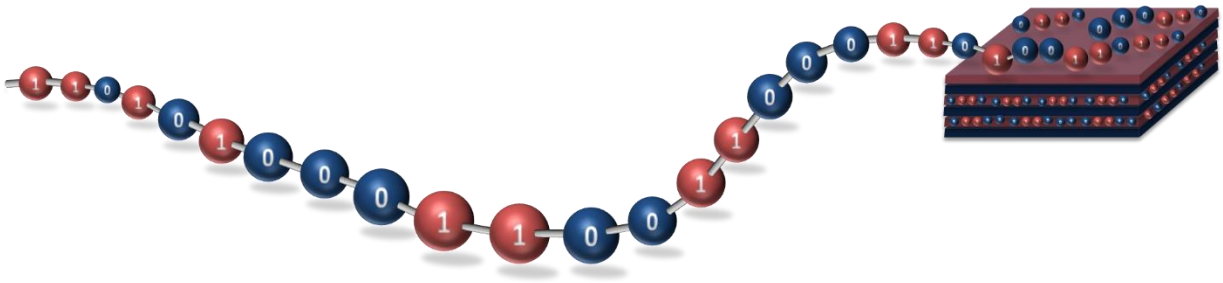

Fig. 1. Representative structure of materials for data storage applications. The digital polymers are spatially ordered to create “sequence of sequences”.

References

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