Synthesis of Oligothiophenes and Nucleobase-Substituted Polyaramides

Nicolas Dürig

Master in Chemistry

In this thesis, two different projects were investigated. The commonality of these projects is the coupling of monomers by amide bonds.
The first project deals with the solid-supported synthesis of oligothiophenes coupled by amide bonds to facilitate the synthesis of sequence controlled oligothiophenes. Oligothiophenes have good electronic, optical and magnetic properties to be used in a variety of electronic and optical devices, such as solar cells, OLEDs, spintronics, sensors and others. Their sequence-controlled synthesis requires harsh conditions. The goal of this project is to couple the thiophene rings by amide bonds to achieve milder reaction conditions with high sequence control and simple purification methods. To further facilitate the solid supported synthesis, it was thought to use a peptide synthesizer for faster and easier, partly automated synthesis.
The second project deals with the synthesis of monomers for “artificial DNA strands”, aromatic amino acids substituted with natural nucleobases. The idea is to mimic the behavior of DNA related processes to generate a macromolecular structure and also a recyclable template for sequence-controlled polymerization. To do so, an aromatic amino acid was modified with a nucleobase and coupling of monomers by amide bonds give them high rigidity and stability. Two different approaches were investigated, one where the nucleobase is coupled to the monomer by Sonogashira-coupling and another where the nucleobase is coupled by an amide bond.

Prof. Dr. Andreas F. M. Kilbinger