

Abstract

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Synthesis of photoswitchable hybrid systems

Due to their diverse application possibilities in the field of materials science and biology photochromic compounds gain in importance. In this context, the present work dealt with the preparation of photoswitchable hybrid systems. In a first materials science related part an azobenzene linker conjugate was synthesized. Its derived asymmetrical disulfide was supposed to serve for the preparation of dilute self-assembled monolayers on gold surfaces. For this purpose, a method for the synthesis of asymmetric disulfides was tested on a model system. Furthermore, a series of tailor made chromenes was prepared. They were investigated via IR spectroscopy in solution to evaluate their suitability for the immobilization on silicon(111) surfaces. In addition, an iron-catalyzed cross-coupling reaction was tested on one of the synthesized naphthopyrans in order to open an elegant way for the preparation of photoswitchable inorganic-organic or even biological hybrid systems. In a second biological oriented part of this work the binding of model peptides to azobenzene-, HTI- and 2*H*-chromene-based thioesters in auxiliary-mediated chemical ligations was investigated. This should open a way for the preparation of photoswitchable peptides that are difficult to access by conventional methods such as solid phase peptide synthesis. Furthermore, two functionalized proline building blocks and corresponding oligoproline derivatives were synthesized. In addition, the reaction between one of the resulting oligoproline derivatives and a dithienylethene in a copper(I)-catalyzed azide-alkyne cycloaddition reaction for the preparation of water-soluble photoswitchable compounds was tested. Finally, a bicyclo[1.1.1]pentane linker was prepared for the synthesis of fluorophore-chromophore conjugate and the connection of photoswitchable compounds to metal or metal oxide surfaces.