

SHORT PEPTIDES WITH PHOTOCATALYTIC ACTIVITY FOR THE NUCLEOPHILIC ADDITION OF METHANOL TO STYRENE DERIVATIVES

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The field of Photoredoxcatalysis offers new reaction pathways by using light as sustainable and abundant energy source. Especially the functionalization of alkenes offers great potential for further applications.^[1,2] The photocatalytic addition of nucleophiles to styrene derivatives using pyrene or perylene bisimides was investigated by our group.^[3]

The choice of the catalyst controls the regioselectivity of the reaction. Using (*N,N*)-dimethylaminopyrene forms the Markovnikov product in high yields, whereas with perylene bisimides the corresponding anti-Markovnikov product is obtained. However, additives like triethylamine or thiophenol as shuttle molecules for electron and proton transfer are needed to ensure an efficient catalysis. In order to avoid additives, the use of peptide chains leading to a substrate binding mechanism was investigated.^[4] Peptides are well established as organocatalysts because they are cheap, non-toxic, easily accessible and they are able to enhance enantioselectivity.^[5–8] Moreover, the solubility and catalytic properties of the chromophors can be tuned by modification of the peptide chain. Different proline-chain peptides bound to pyrene are investigated and show that there is a favorable orientation of the substrate binding site to the catalyst.^[9] These results provide a better understanding of the substrate binding mechanism. While the proline-type turn enhances the catalytic efficiency, the proline-induced helical structure is not completely necessary. In future experiments, it has to be shown how the secondary structure of the peptide influences the enantioselectivity of the catalysis by incorporation of different peptides.

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