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Formation of triazole photoswitches on azide modified structures via click reaction

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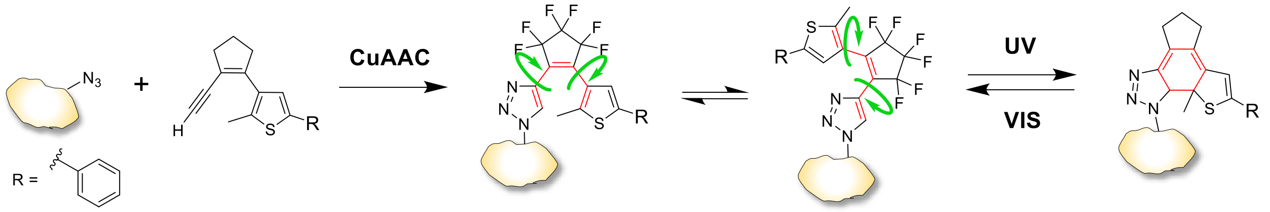
Photochromism can be found in many natural biological systems. Among artificial photoswitchable molecules, diarylethenes represent a class with excellent properties and numerous applications are described[1]. Examples such as the incorporation into cyclic peptides show their potential for light control of biological systems[2]. Therefore, differences in flexibility between the phototransformable isomers play an important role. Our group investigates diarylethenes in which one of the typical aryl groups (e.g. thienyles) is replaced by a nucleobase[3],[4]. The compounds show good photochromic properties and can be positioned linker-free and flexibly in oligo-DNA strands via Suzuki-Miyaura Cross-Coupling[5]. An improvement of the flexible introduction that maintains a maximum short linker at the same time led us to the design and synthesis development of novel triazole photoswitches. The photochromes are formed via copper-catalysed click reaction (CuAAC).



Thus, they have potential for an easy introduction of the photochromic unit to variable azide-modified structures including biological systems. The triazole functions as a linker that is already a part of the photochrome moiety and provides a linker free attachment of the photochrome in high proximity to the target structure.

The new class of molecules shows a strong dependence of their properties on structural modifications, so that the focus is first of all on a structural property analysis and structure optimization. Furthermore, reaction conditions and requirements are optimized for applications in biological systems. The compounds have potential not only for introduction into a variety of systems, but also for modular combinations with further functional molecules like fluorophores, what may lead to the development of new tagging reagents.

[1] M. Irie, T. Fulcaminato, K. Matsuda and S. Kobatake, *Chem Rev*, **2014**, *114*, 12174-12277.
[2] O. Babii, S. Afonin, M. Berditsch, S. Reisser, P. K. Mykhailiuk, V. S. Kubyshkin, T. Steinbrecher, A. S. Ulrich and I. V. Komarov, *Angew Chem Int Edit*, **2014**, *53*, 3392-3395.
[3] M. Singer and A. Jäschke, *J Am Chem Soc*, **2010**, *132*, 8372-8377.
[4] H. Cahova and A. Jäschke, *Angew Chem Int Edit*, **2013**, *52*, 3186-3190.
[5] C. Sarter, M. Heimes and A. Jäschke, *Beilstein J Org Chem*, **2016**, **12**.