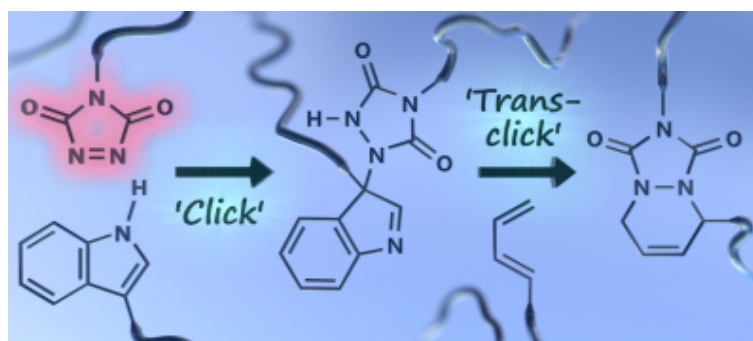


416 - Triazolinediones enabling click and transclick reactions

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The concept of click chemistry was introduced by Sharpless *et al.* not much more than a decade ago,¹ and the reactions it advocates have rapidly found their way into the standard toolbox of many research disciplines, also outside of the chemical sciences.² The search for suitable combinations of modular reagents (and catalysts) that can result in a very efficient and reliable covalent coupling is an important objective of ongoing fundamental chemical research.³ Some subdivisions have even become more strict with regard to which reaction characteristics are desirable for click chemistry applications, as was recently proposed for the polymer community.⁴ Many alternative systems for the archetypical copper-catalyzed azide-alkyne cycloaddition have been suggested in recent years each with *their* advantages and disadvantages. However, the quest for a truly versatile system is still continuing. In the ideal case, such a system, besides having all characteristics associated with the click concept, should also offer a choice between irreversible and reversible connections. For example, in the case of polymer chemistry applications, dynamic or reversible covalent bonds are highly desired nowadays as these can be used to elicit unique material properties such as self-healing, recycling and network malleability.



Here, we introduce the use of triazolinedione compounds as scalable and robust building blocks for click chemistry applications, by presenting examples of facile and ultrafast macromolecular functionalization, polymer-polymer linking and polymer cross-linking under ambient conditions without the need for a catalyst. Moreover, triazolinediones, when combined with indole reaction partners, can also be 'unclicked' at elevated temperatures, and furthermore integrally transferred to an alternative reaction partner. This new concept of 'transclick' reactions has also been used to introduce thermoreversible links into materials, giving rise to dynamic bulk properties such as polymer network healing, reshaping and recycling.⁵

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