New tools and uses of dynamic covalent chemistry

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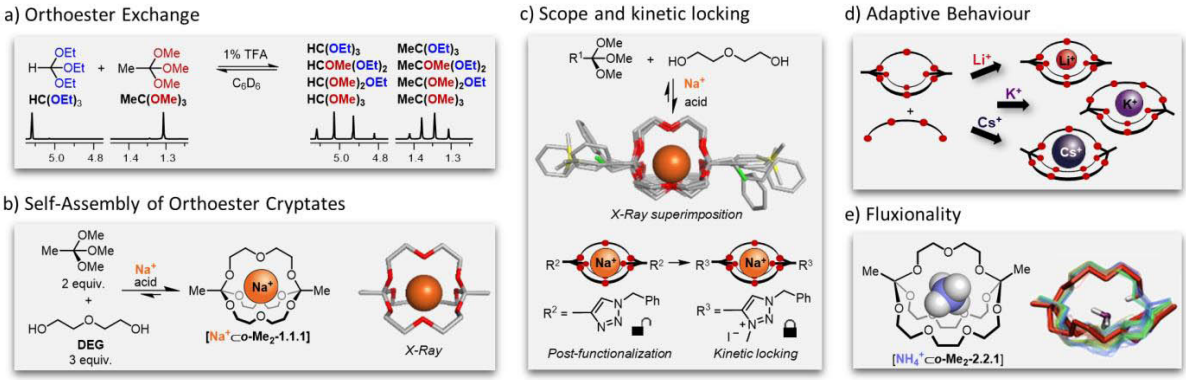
Dynamic covalent chemistry (DCC) is a powerful tool for probing non-covalent interactions, identifying ligands for medicinally relevant biological targets, and for making use of the feature of "error correction" to achieve the synthesis of interesting molecules and materials.[1]

In this talk, I will present our recent work on a previously ignored dynamic covalent reaction: the acid-catalyzed reaction of O,O,O-orthoesters with alcohols (Fig. 1a),[2a] which we were able to use for the one-pot synthesis of cryptates, in which orthoesters act as tripodal bridgeheads.[2b] Due to their unique structure (Fig. 1b), these compounds exhibit a range of unusual properties, including tunable, pH-dependent hydrolysis (Fig. 1c).[2c] Most notably, dynamic orthoester architectures offer an elegant entry to experiments, in which a metal ion selects its preferred host from a dynamic mixture of competing subcomponents ("adaptive host-guest systems", Fig. 1d).[2d] Of particular relevance to the area of systems chemistry is our recent discovery that ammonium complexes of orthoester cryptands represent the first example of "fluxional supermolecules", i.e. these host-guest complexes are inherently dynamic and adaptive (Fig. 1e).[2e]

I will close the talk by discussing unpublished work on "new" dynamic covalent reactions and their (potential) uses.



References

1. J.-M. Lehn, "Perspectives in Chemistry − Aspects of Adaptive Chemistry and Materials", *Angew. Chem. Int. Ed.* **2015**, *54*, 3276.

2. a) R.-C. Brachvogel, M. von Delius, *Chem. Sci.* **2015**, *6*, 1399. b) R.-C. Brachvogel, F. Hampel, M. von Delius, *Nat. Commun*. **2015**, *6*, 7129. c) H. Löw, E. Mena-Osteritz, M. von Delius, *Chem. Sci.* **2018**, *9*, 4785. d) O. Shyshov, R.-C. Brachvogel, T. Bachmann, R. Srikantharajah, D. Segets, F. Hampel, R. Puchta, M. von Delius, *Angew. Chem. Int. Ed.* **2017**, *56*, 776. e) X. Wang, O. Shyshov, M. Hanževački, C. M. Jäger, M. von Delius, *J. Am. Chem. Soc.* **2019**, *141*, 8868.