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Unifying Concepts in Catalysis

UniCat Colloquium

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Cationic carbon and boron Lewis acids for the activation of sigma and pi bonds

As part of the renaissance in main group chemistry $B(C_6F_5)_3$ and derivatives have played a pivotal role as strong Lewis acids that are able to activate a range of π and σ bonds. The latter discovery started the growing field of "frustrated Lewis pair" (FLP) chemistry which has achieved significant advances in catalysis, e.g., the reduction of a multitude of unsaturated systems without requiring precious transition metal catalysts.

Whilst $B(C_6F_5)_3$ and derivatives are ubiquitous they have a number of drawbacks including requiring complex synthesis for systematic structure modulation and possessing considerable oxophilicity; indeed they are archetypal hard Lewis acids thus bind H_2O strongly and have functional group / impurity compatibility issues. Our group's major research interest is in the use of cationic Lewis acids, both boron and carbon based, as highly tuneable, simple to synthesise Lewis acids. For example the hydride ion affinity (a measure of soft Lewis acidity) of borocations and carbocations can be readily tuned over a range > 50 $kcalmol^{-1}$.

This has enabled numerous synthetic applications, including stoichiometric functionalisation of arenes and alkynes (C-H electrophilic borylation and elemento-boration) and the activation of sigma bonds, specifically C-H, H-H and Si-H. One notable difference between borocations and carbocations are that the latter are hydride selective Lewis acids, they are strong Lewis acids towards hydride yet demonstrate little propensity to bind oxo Lewis bases such as water and Et_3PO. This talk will focus on our recent work using these two classes of cations in the stoichiometric and catalytic activation of sigma and pi bonds which has led to new FLP transformations including metal free *trans*-hydroboration, reductive amination, electrocatalysis of H_2 oxidation and hydrocarbation.

Wednesday, May 18, 2016 at 5:15 PM
TU Berlin, Institute of Chemistry
Straße des 17. Juni 115, 10623 Berlin

Building C, Lecture Hall **C 264**

Prof. Dr. Oestreich (TUB)
Organizer

Coffee and cake will be served 30 minutes before the lecture. Guests are cordially invited to attend!
Prof. Dr. Matthias Driess - Chair of the Cluster of Excellence UniCat - www.unicat.tu-berlin.de