Catalytic activity and asymmetric induction of carbohydrate-functionalised transition metal–NHC systems

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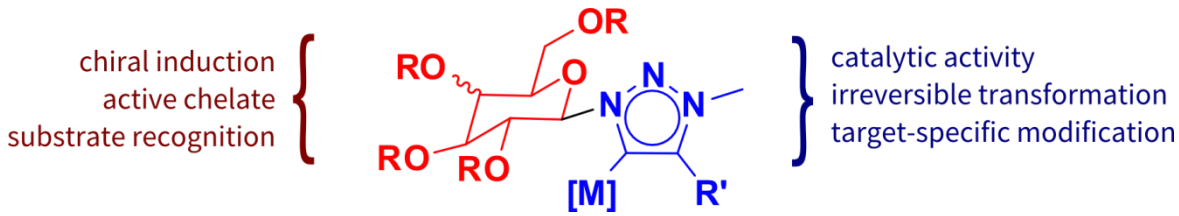
1,2,3-Triazolylidene NHC ligands have been demonstrated to have broad applications for materials science and biochemistry, but in particularly they show great promise as transition metal ligands in the field of homogeneous catalysis.[1] In order to advance these systems towards applications in asymmetric catalysis, functionalisation of mesionic donor ligands with optically pure wingtip groups is an attractive strategy. Carbohydrates represent a natural pool of chirality and functionality, offering a broad range of well-defined stereochemistry and water solubility. Introduction of these natural building-blocks into the structure of organometallic species offers the potential to investigate their interaction with biological systems. CuAAC click chemistry can be conveniently used to combine these two classes of molecule into hybrid systems (Figure 1).



Only a handful of carbohydrate—NHC transition metal complexes have been investigated as catalysts,[2] although such decoration of phosphine and phosphinite ligands has been a promising avenue of research for asymmetric catalysis.[3] We present a series of new hybrid complexes and report their catalytic activity under mild conditions, with attention paid to the direct impact of the stereochemistry of the carbohydrate on the enantiomeric ratio of the products.

[1] a) L. Mercs, and M. Albrecht, *Chem. Soc. Rev.*, **2010**, *39*, 1903; b) M. Melaimi, M. Soleilhavoup, and G. Bertrand, *Angew. Chem. Int. Ed.,* **2010**, *49*, 8810; c) P. Matthew, A. Neels, and M. Albrecht, *J. Am. Chem. Soc.*, **2008**, *130*, 13534.

[2] For example: A. S. Henderson, J. F. Bower, M. C. Galen, *Org. Biomol. Chem.*, **2014**, *12*, 9180; K. J. Kilpin, S. Crot, T. Riedel, J. A. Kitchen, P. J. Dyson, *Dalton Trans.*, **2014**, *43*, 1443. R. Pretorius, J. Olguín, M. Albrecht, *Inorg. Chem.* **2017**, *56*, 12410, d) W. Zhao, V. Ferro, M. V. Baker, Coord. Chem. Rev. 2017, 339, 1

[3] S. Woodward, M. Dieguez, O. Pamieez, *Coord. Chem. Rev.*, **2010**, *254*, 2007.