New developments in bio-hybrid mediated catalysis to a wider synthetic applicability of oligonucleotides as universal chiral scaffolds

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Bio-inspired asymmetric catalysis, using the inherent chirality of biomolecules in combination with a transition metal, became a very attractive synthetic tool. Among all these bio-inspired catalysts, oligonucleotides stand out, taking profit of the powerful chirality imposed by the double helix of DNA or RNA and the strong ligation possible with a wide range of metallic co-factors. The concept of DNA-based hybrid catalysis was first introduced in Cu(II)-catalysed reactions and immediately led to the development of other asymmetric C-C and C-heteroatom bond forming reactions. Our group has recently been interested in the development of DNA-based asymmetric catalysis trying to unveil new synthetic applications. We therefore first developed the use of non-natural left handed L-DNA as a universal tool to control the stereoselective outcome of any reaction and also took interest in merging DNA-hybrid catalysis with heterogeneous catalysis using cellulose-supported oligonucleotides. We further continued our quest of synthetic applicability in developing new oligonucleotide-conjugates as multivalent chiral platform showing unprecedented catalytic activity in known reactions. Also, aiming at a deeper understanding of the chirality transfer occurring between oligonucleotide catalyst and a substrate, we developed new minor groove binding ligands Hoechst 33258 derivatives for the development of sequence-specific catalysis and also turned our attention on the use of RNA as alternative chiral scaffold for asymmetric catalysis.

Biography


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