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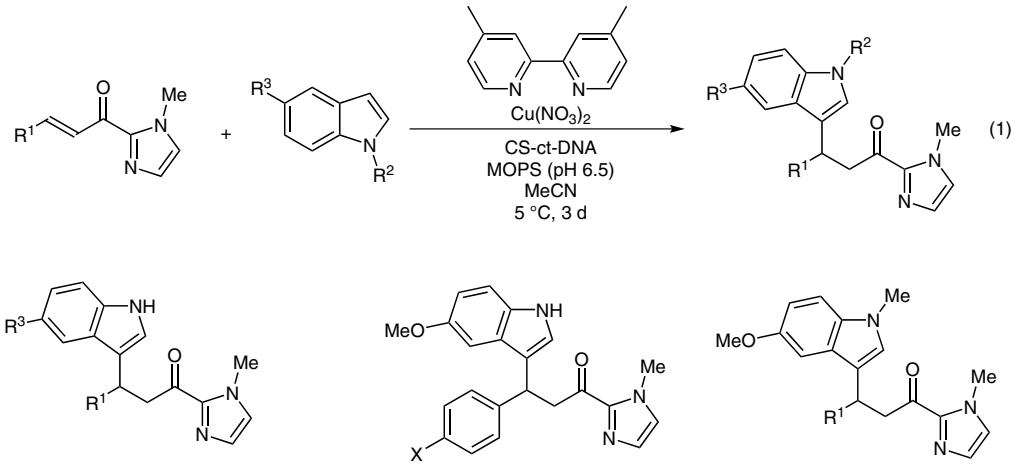
DNA-Cellulose: An Economical, Fully Recyclable and Highly Effective Chiral Biomaterial for Asymmetric Catalysis
Chem. Commun. **2015**, *51*, 6076–6079.

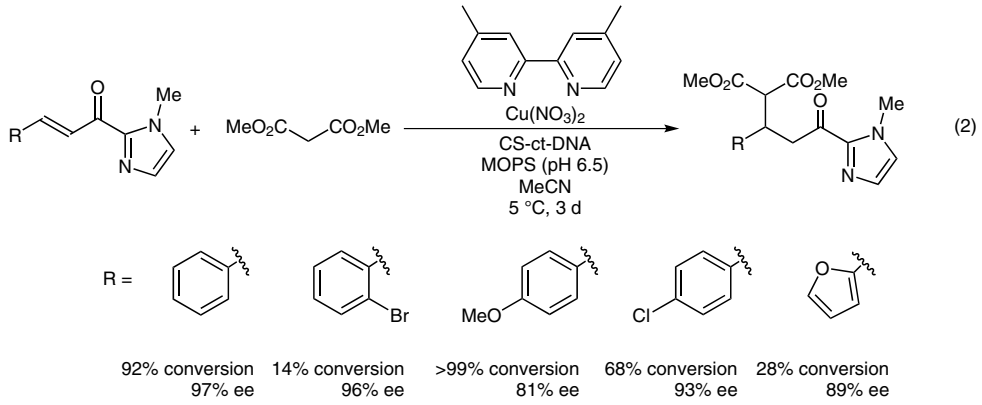
A Cellulose-Supported DNA-Based Ligand for Asymmetric Catalysis



R^1 = Me, R^3 = OMe >99% conversion, 81% ee (**A**)
R^1 = Me, R^3 = Cl >99% conversion, 73% ee
R^1 = Me, R^3 = Br 96% conversion, 66% ee
R^1 = *n*-Pr, R^3 = OMe >99% conversion, 83% ee
R^1 = *n*-Pent, R^3 = OMe >99% conversion, 73% ee

X = H >99% conversion, 62% ee
X = OMe 80% conversion, 54% ee
X = Cl >99% conversion, 50% ee

R^1 = Me 34% conversion, 78% ee
R^1 = C_6H_5 >99% conversion, 76% ee
R^1 = 2-BrC_6H_4 25% conversion, 65% ee



92% conversion, 97% ee
14% conversion, 96% ee
>99% conversion, 81% ee
68% conversion, 93% ee
28% conversion, 89% ee

Significance: Copper-catalyzed asymmetric Friedel–Crafts alkylations (eq. 1) and Michael additions (eq. 2) proceeded in the presence of cellulose-supported calf thymus DNA and 4,4′-dimethyl-2,2′-bipyridine (dmbpy) to give the corresponding alkylation products with up to >99% conversion and up to 97% ee.

Comment: In the formation of compound **A**, the catalyst was recovered and reused nine times without adding any copper or dmbpy. Compound **A** was also prepared in 96% conversion and up to 80% ee by a continuous-flow process using the DNA-based catalyst packed in a medium-pressure liquid chromatography cartridge (residence time: 38 min, room temperature).

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Category
Polymer-Supported Synthesis

Key words
DNA
asymmetric catalysis
Friedel–Crafts alkylation
Michael addition
copper