SUPPORTED CHIRAL ORGANOCATALYST FOR STEREOSELECTIVE REACTIONS UNDER BATCH AND CONTINUOUS FLOW CONDITIONS

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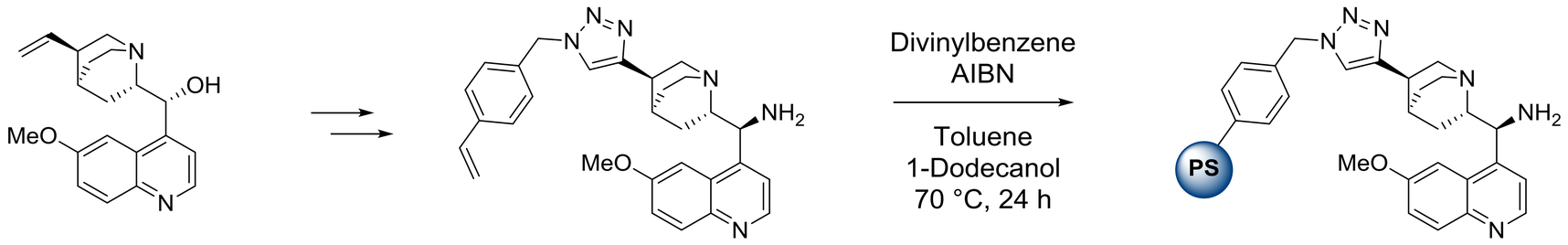
Chiral primary amines derived from cinchona alkaloids represent a well-established class of stereoselective organocatalysts capable of promoting a great number of chemical transformations with excellent levels of enantioselectivity.[1]

Their immobilization onto a polymeric support is an attractive procedure to develop an easily recyclable heterogeneous catalytic system.



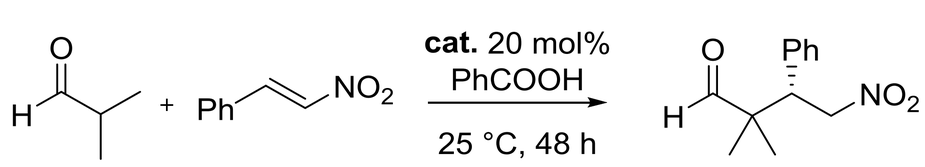
Quinine ***Chiral monomer*** **Polymer-Supported Catalyst**

Stereoselective Reactions under Batch Conditions

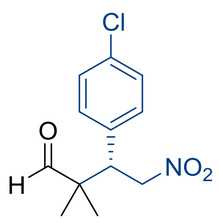
The supported catalyst proved to be very efficient, versatile and well comparable to the corresponding non-supported one.[2]

En

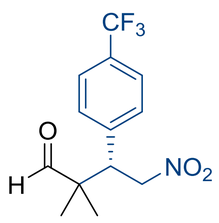
Enamine catalysis



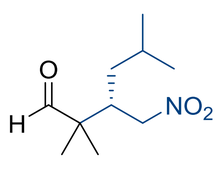
Reaction Scope



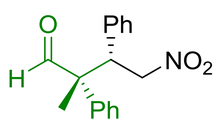
99% yield
90% ee



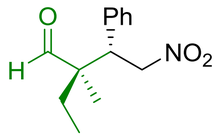
78% yield
97% ee



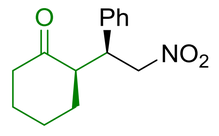
64% yield
97% ee



77% yield
20:1 dr
82% ee



78% yield
2:1 dr
94% ee



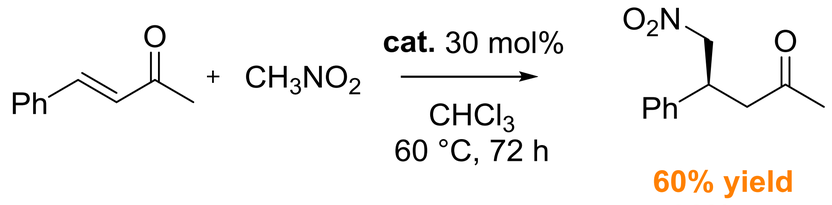
65% yield
83% ee

Recycling Experiments

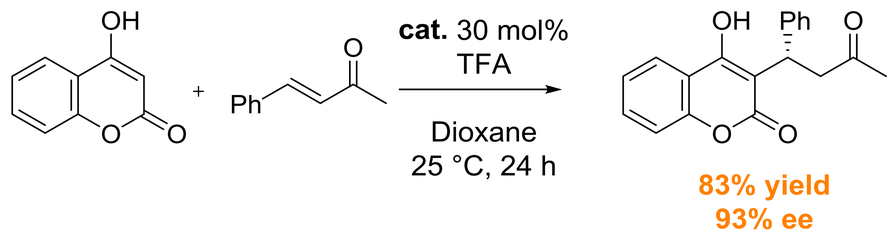
Cycle	yield (%)	ee (%)
1st	99	95
2nd	99	94
3rd	88	96
4th	53	96
5th	37	97
6th	28	95

Im

Iminium ion catalysis



60% yield
90% ee

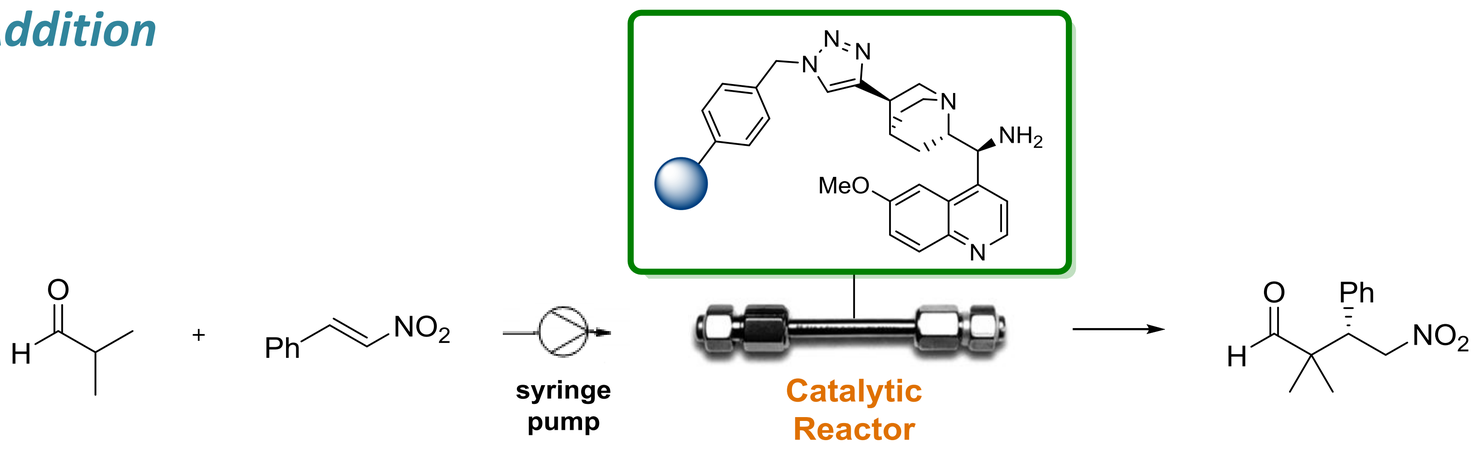


83% yield
93% ee

Continuous Flow Stereoselective Reactions

The confinement of supported catalyst into flow reactors represents an intriguing methodology to perform stereoselective reactions *in continuo*.[3]

Michael Addition



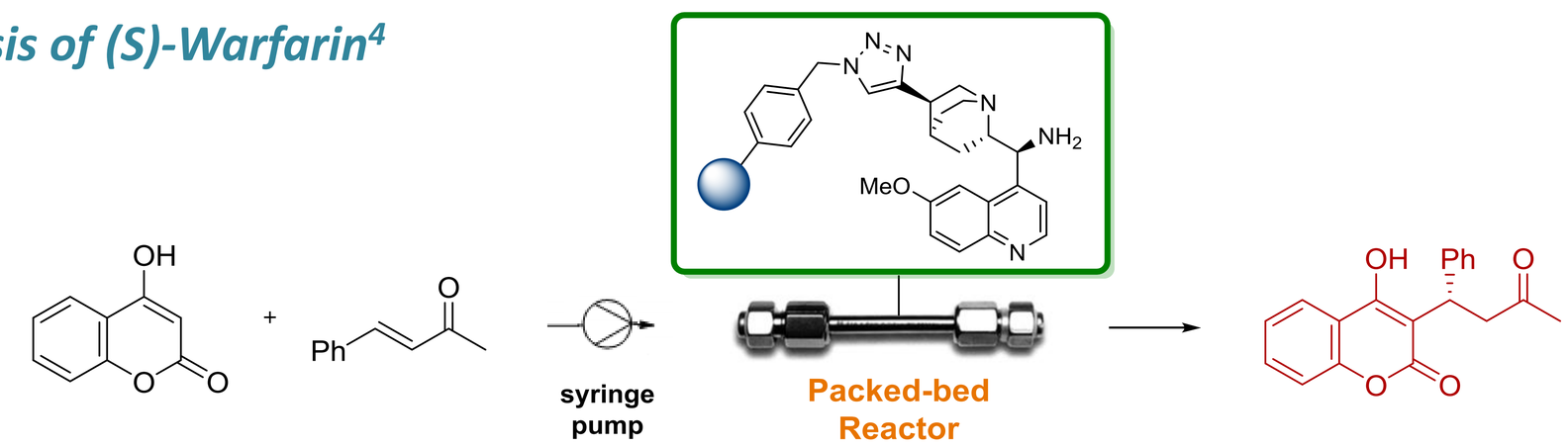
PACKED-BED

200 h process
yields up to 99%
ee up to 92%

MONOLITHIC

flow rates up to 0.6 mL/h
yields up to 76%
ee up to 87%

Synthesis of (S)-Warfarin[4]



Widely Prescribed Anticoagulant

residence time 5 h
yields up to 90%
ee up to 87%

References:

[1] Review: Melchiorre, P. *Angew. Chem. Int. Ed*. **2012**, *51*, 9748-9770.

[2] Porta, R.; Benaglia, M.; Coccia, F.; Cozzi, F.; Puglisi, A. *Adv. Synth. Catal*. **2015**, DOI: 10.1002/adsc.201400821.

[3] Review: Puglisi, A.; Benaglia, M.; Chiroli, V. *Green Chem.* **2013**, *15*, 1790-1813.

[4] Unpublished results.