Toward More Efficient Organocatalysts

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Organocatalysts are robust metal-free organic compounds of low molecular weight and simple structure, able to promote organic reactions in substoichiometric amounts. They have received paramount interest in the last years, becoming the third pillar of asymmetric catalysis.[1] However, organocatalysts are usually employed in substantial quantity, in some case up to 30 mol-%, and due to their organic nature, they can add complexity to products separation. Moreover, some sophisticated and synthetically time-consuming catalysts are used but not recovered. In these cases, it became fundamental to design strategies in order to reduce costs and to facilitate the separation of the products.[2]
In this regard, in the last recent years we have been engaged in developping two different approaches aimed to overcome organocatalysts drawbacks: a) the immobilization of the catalyst onto an inert support; b) the synthesis of more efficient and active cheap catalysts (Figure 1).

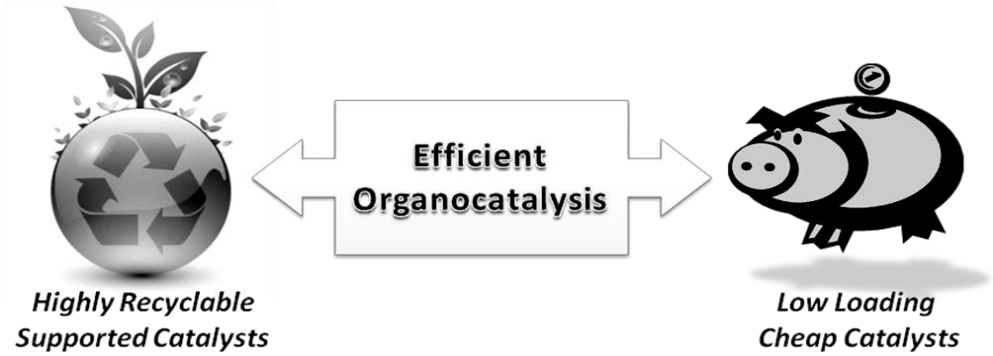

Figure 1.

In the first approach, several organocatalyst have been immobilized both covalently or not and the new catalytic materials revealed to be stereoselectives toward the direct aldol reaction and, in the meantime, highly recyclable.[3] Beside the ease of handling, separation and recycle, the immobilization often benefits from the additional morphological properties of heterogeneous supports, which may have a great influence on the outcome of the reactions. On the other hand, a series of easily synthesized cheap proline-based catalysts have been successfully employed in the above reaction with low loading, down to 2-0.1 mol-%, showing excellent performances in terms of yields and stereoselectivity with no need for extended reaction times.[4]

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3. a) Aprile, C., Giacalone, F., Gruttadauria, M., Mossuto Marculescu, A., Noto, R., Revell, J. D., Wennemers, H. *Green Chem.*, **2007**, *9*, 1328; b) Gruttadauria, M., Giacalone, F., Mossuto Marculescu, A., Noto, R., *Adv. Synth. Catal.*, **2008**, *350*, 1397.
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