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Organocatalyzed synthesis of cyclic carbonates from CO₂ and renewables

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PURPOSE OF THE ABSTRACT

The chemical fixation of CO₂ into valuable products has attracted much attention in recent years. In this context the conversion of CO₂ with epoxides to the corresponding cyclic carbonates is an attractive and extensively studied reaction.[1] We are generally interested in the synthesis of cyclic carbonates from petrochemical as well as renewable feedstocks. Recently we reported efficient sustainable metal-based[2] catalyst systems enabling the conversion of CO₂ with epoxides under mild conditions. Moreover we elaborated a structural design concept for one-component organocatalysts for this reaction.[3] Furthermore, we evaluated different concepts for the recycling of these catalyst, e.g. by immobilization and organic solvent nanofiltration.[4]

Most recently we turned our attention to the atom-economic reaction of CO₂ and epoxidized oleochemicals.[5] Notably, these products are obtained in yields up to 99% from CO₂ and renewable feedstocks under comparatively mild and solvent-free reaction conditions. Furthermore, in respect to carbon they are based on >99% CO₂, combining biological and chemical CO₂ and thus represent an excellent example for Green Chemistry. We will discuss our efforts in cyclic carbonate synthesis with the emphasis on oleochemical carbonates.

FIGURES

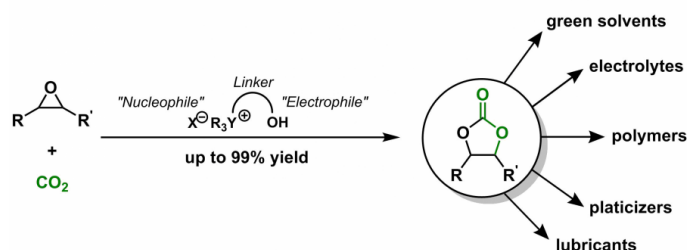


FIGURE 1

Cyclic carbonates synthesis and possible applications

The synthesis of cyclic carbonates from CO₂ and epoxides as well as our design concepts of bifunctional organocatalysts are depicted.

FIGURE 2

KEYWORDS

CO₂ utilization | oleochemical carbonates | cyclic carbonates | organocatalysis

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