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Synthesis and application of organocatalysts anchored to oligosaccharides and their recoveryJozsef Kupai¹, Peter Kisszekelyi¹, Balint Zeller¹, Sandor Nagy¹, Petra Kozma¹ and Peter Huszthy¹¹BUTE, Hungary

Organocatalysis, in which organic molecules catalyze single or multiple chemical transformations, has emerged as an efficient solution for the rapid and stereoselective synthesis of enantiomerically enriched molecules. Due to the many advantages of organocatalysis compared to conventional metal catalysis, organocatalytic methodologies have become an attractive synthetic tool in asymmetric catalysis. Cinchona alkaloids and their derivatives have proven to be powerful organocatalysts owing to their reactivities, leading to high enantioselectivities. The presence of tunable functional groups enables cinchona alkaloids to catalyze a broad range of chemical reactions. Chiral thioureas and squaramides are promising classes of cinchona-based organocatalysts. Based on non-covalent interactions they behave as very efficient, directional hydrogen-bond donors. Nowadays more and more attention is paid to protect our environment, and catalyst recovery can be a useful tool to reach this goal. Nanofiltration is a relatively recent membrane filtration process which –in special cases – allows the separation of different organic molecules. Attaching cinchona moieties on oligosaccharides (see Figure 1.) seems to be an effective way to achieve convenient organocatalysts that can be easily separated from the reaction mixture. New cinchona-based organocatalysts were prepared starting from different types of oligosaccharides and hydroquinine. These bifunctional organocatalysts were applied successfully with high yield and enantioselectivity in asymmetric Michael additions between different types of Michael donors and acceptors. After the enantioselective reactions, separation of the products and the oligosaccharide-based catalysts were carried out applying the nanofiltration method with high efficiency resulting in a sustainable organocatalytic method.

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Figure 1. General structure of the new oligosaccharide-based organocatalyst family.

Biography

Jozsef Kupai focuses on the synthesis of enantioselective catalysts bearing cinchona alkaloid moieties. His research group applies cinchona-thioureas and squaramides in Michael additions with excellent yields and enantioselectivities. It was necessary to find different methods for the recovery of these catalysts to reach their sustainable application. Therefore, immobilization of cinchonas to different solid supports were achieved. On this conference, he will demonstrate the new immobilization methods of cinchona catalysts to make them appropriate for recovery by different techniques.

jkupai@mail.bme.hu

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