

Bas van den Berg

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Project	Covalently Attached Organocatalysts in Microreactors
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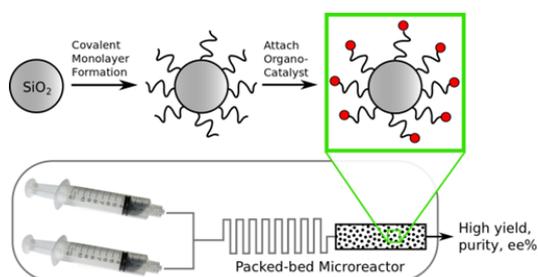


Introduction

Traditionally, reactions have been performed in the ubiquitous round-bottom flask. However, scale-up of certain reactions (e.g. exothermic reactions or reactions where dangerous reagents are used) pose safety issues. Microreactors have been developed to deal with these problems. Because of small channels and large surface areas, heat transfer and mixing are much better than in standard batch-type glassware. This enables the use of “forbidden” reactions at high temperatures with excellent control over reaction conditions, often avoiding formation of by-products and waste.

A drawback of microreactors is the inability to handle liquid-solid reactions. All reagents must remain in solution to prevent clogging and damage of the microreactor may occur. A packed bed reactor can be used to load a solid-supported catalyst.

A problem arises with polymeric supports, as these may swell in organic media. Silica-based supports have a larger solvent compatibility and do not swell. However, monolayers made with silane chemistry are not stable under some conditions.



Goal

Our goal is to make a solid-supported catalyst that can be used in a microreactor system continuously, without degradation of activity.

We try to do this via covalently attached, functional monolayers on solid supports such as silica (SiO_2) using alkene-chemistry developed in our group¹.

Progress achieved

Monolayers of a trifluoroethyl ester have been put on silica spheres. We have made several catalysts based on proline and have tested other reactions in a microreactor (piperidine-catalyzed synthesis of coumarins, Knoevenagel reactions).

Further research

The aim of the current research is to further develop the technique of creating functional monolayers on silica spheres, modify them with a catalyst and test them in a microreactor.

Acknowledgement

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References

1. J. ter Maat *et al.*, *Langmuir*, **2009**, 25 (19), pp 11592–11597