ICS-OTRI 講演会のご案内

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題目： Combination of the two "worlds" chemo- and biocatalysis towards one-pot processes in water

場所： C1-311　（会議室ではありませんのでご注意ください）

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Gröger 教授は、生体触媒による有機合成とその実用的プロセスへの応用といった分野で活躍されている研究者です（最近の論文：*Angew. Chem. Int. Ed.* **2021**, *60*, 193162.）。皆様のご来聴を歓迎いたします。なお、10 月 7 日には異なる内容での林高史教授主催のセミナーもあります。

連絡先　鳶巣 守（内線７４１３）

Combination of the two "worlds" chemo- and biocatalysis towards one-pot processes in water

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Multi-step one-pot processes represent an attractive concept for improving chemical processes by decreasing the number of work up and purification steps. By avoiding such time-, capacity- and solvent-intensive process steps, multi-step one-pot syntheses contribute to significantly improved overall process efficiency, process economy as well as sustainability. A key criterion for multi-step one-pot processes is compatibility of the individual reaction steps with each other. Accordingly, most of today´s known multi-step one-pot processes are based on either chemocatalytic multi-step reactions or "pure" biotechnological processes such as, e.g., fermentation. In contrast, successful combinations of chemo- and biocatalytic reactions, in particular in aqueous reaction media, are much less widely known.[1]

In this contribution, strategies for combining chemo- and biocatalysts towards the development of multi-step one-pot processes particularly in aqueous reaction media are presented. Since palladium-catalyzed cross-coupling reactions are of particular importance in the field of metal catalysis, as enzymatic reductions are in the field of biocatalysis, we were interested in the investigation of the compatibility of these types of reactions with each other in water. An example for such a one-pot process is the synthesis of chiral biaryl-containing alcohols via Suzuki-cross-coupling reaction and subsequent asymmetric enzymatic reduction.[2] A further research focus has been on the combination of enzyme-compatible organocatalytic reactions with biotransformations. It turned out that a reaction mixture resulting from an asymmetric organocatalytic aldol reaction is compatible with a direct subsequent enzymatic reduction without the need for a work-up step of the aldol reaction.[3]

When utilizing catalysts, which strongly differ in their "process windows", conditions for compatibility and a combined use in the same reaction environment might not be reached. In these cases, compart-mentalization might be a solution for combining them in a cascade process in one reactor. Such a compartmentalization approach for a one-pot process was demonstrated, e.g., for the combination of a palladium-catalyzed Wacker-oxidation with an alcohol dehydrogenase-catalyzed ketone reduction.[4] In a collaboration with the Akai group (Osaka University), using a heterogenized vanadium catalyst and an enzyme in organic medium enabled the first dynamic kinetic resolution of a tertiary alcohol.[5]

References

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