

## **Abstract**

Biocatalysts are promising alternatives to conventional chemical homogenous or heterogeneous catalysts, because they are able to realize reactions under ambient conditions. Since these enzymes show often comparable low process stabilities, immobilization is highly interesting to increase stability and productivity. During this study, spray congealing was investigated as new immobilization technique, whereby two different set-ups were compared and the immobilized enzymes characterized. Thereby, spray congealing with a modified spray dryer showed beside smaller particles, higher residual activities and furthermore a better recyclability compared to a self-developed spray congealing apparatus. Furthermore, an ionic liquid was found as interesting new carrier for this application, due to 30% residual activity of an immobilized esterase after 5 consecutive reactions. In addition, a laccase was immobilized with this method and tested for C-N coupling reactions of catechols and amines. These reactions were comparable unselective, nevertheless, the selectivity could be increased with the usage of a fed-batch reactor and slow substrate addition at pH 5. With these conditions a compromise between amine availability and pH optimum of the enzyme was found and the coupling of different amines could be realized.