Abstract

In the current discussion about the inevitable medium- and long-term reorganization of our chemical value chains from fossil fuel reservoir to renewable raw materials, biogenic furans play an essential role as versatile platform chemical. Even though the utilization of this heterocyclic building block as alternative source for fuels or novel polymers are ongoing research, less attraction was given to synthetic applications in terms of complex molecule structures. This thesis deals with the establishment of biocatalytical transformations of furfural based alcohols in highly functionalized pyranones as mild and green alternative to classical achmatowicz rearrangements. By the linkage of glucoseoxidase as oxygen activating biocatalyst and chloroperoxidase as oxygen transfer agent, it was possible to create an artificial Achmatowicz-Monooxygenase. Combination with enzymatic transformations for the enantioselective synthesis of optically active furylcarbinols accomplished the establishment of purely biocatalytic cascades for the formation of complex pyranone building blocks.