Sequestration of carbon dioxide by enzymatically-catalyzed carboxylation of aromatics

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The rising level of CO_2 in the atmosphere is generally accepted as a significant contributor to climate change. As a result, carbon capture projects have gained substantial traction in recent years, although sequestering CO_2 into long-term storage is not an ideal solution. A plausible alternative is to use CO_2 as a feedstock for organic synthesis, which would mitigate both rising CO_2 levels and industrial dependence on petroleum-based feedstocks.

One of the most interesting sets of target molecules is carboxylated aromatics, both benzoic acids and heterocycles; finding routes to such targets is among the goals of our project. Although, the addition of inorganic carbon to an organic molecule tends to be an energetically disfavored process, the Faber group at the University of Graz has demonstrated that enzymes which natively catalyze *de*carboxylation of aromatics can facilitate the carboxylation of aromatics under controlled conditions. [1,2,3] In this study, we present the development of several (de)carboxylases, together with their characterization with respect to activity, selectivity, and stability.

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