

From lab feasibility studies to full scale manufacturing, an overview of Biocatalysis at Novartis Pharma - A journey towards sustainable catalysis

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The gradual implementation of Biocatalysis within Novartis Pharma will be presented over various projects. From enzyme users, we became enzyme designers with the recent implementation of the CodeEvolver technology from Codexis in our Development projects. Our journey towards new and sustainable catalysis, the in-licensing of protein engineering and our efforts to change culture in favor of early implementation of Biocatalysis will be presented.

Selected publications:

[1] . Application of Transition-Metal Catalysis, Biocatalysis, and Flow Chemistry as State-of-the-Art Technologies in the Synthesis of LCZ696, *Journal of Organic Chemistry*; **vol.** 85; nb. 11; (2020); p. 6844 - 6853

[2] .Toward a Scalable Synthesis and Process for EMA401, Part III: Using an Engineered Phenylalanine Ammonia Lyase Enzyme to Synthesize a Non-natural Phenylalanine Derivative, *Organic Process Research and Development*; **vol.** 24; nb. 9; (2020); p. 1763 – 1771

[3] . Biocatalytic assembly of chemically modified oligonucleotides, *Tetrahedron Letters*, Volume 93, 16 March 2022, 153696

[4] . A Bio-logical Approach to Catalysis in the Pharmaceutical Industry, *Chimia* 74 (2020) 407–417