

Chemical Engineering Thesis Defense

Engineering *Escherichia coli* BL21(DE3) for the
Production of 5-Amino-1-Pentanol

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Abstract

Alkanolamines are useful as building blocks for a variety of applications, ranging from medical applications such as drug and gene delivery to the capture of CO₂. In this work, *Escherichia coli* was investigated as a viable candidate for the production of 5-amino-1-pentanol (5-AP). Taking advantage of the existing L-lysine degradation pathway, a novel route to 5-AP was constructed by co-expressing the genes *cadA* (encoding a lysine decarboxylase enzyme responsible for the conversion of L-lysine to cadaverine) and *patA* (encoding a putrescine aminotransferase enzyme), followed by the endogenous reduction of produced 5-amino-pentanal (5-APL) to 5-AP. To preserve 5-APL and avoid accumulation of byproduct 1- Δ piperidine, further host engineering was performed to delete the gene *patD*, responsible for 5-amino-pentanal dehydrogenase during L-lysine degradation. Flask scale fermentation experiments of the newly constructed pathway were conducted and optimized for microbial production of the 5-carbon amino alcohol 5-AP.



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Zoom Link: <https://asu.zoom.us/j/82691982522>