Don’t Be Green on Green Chemistry

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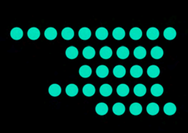
Revolutionize Drug Development with Sustainable Enzyme Engineering

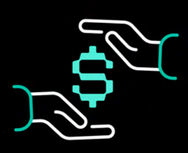
In today's rapidly evolving pharmaceutical landscape, staying ahead of the curve requires not only innovation but also a commitment to sustainability.
Don't be green on green chemistry.

At Allozymes, we believe that sustainable practices and cutting-edge technology can go hand-in-hand. That's why we've harnessed the power of enzyme engineering to revolutionize drug development and manufacturing.

Why enzyme engineering is crucial:



Speed
Accelerate drug manufacturing timelines with efficient and precise enzymatic reactions.

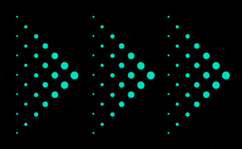


Affordability
Reduce costs associated with traditional chemical synthesis methods.

Success
Increase the likelihood of successful drug candidates with tailored enzyme-based approaches.

Scalability
Ensure economic viability and large-scale production of therapeutic molecules.

Eco-friendliness
Minimize environmental impact by reducing waste and energy consumption.



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Enzyme for Biosensing Application

Case Study

A commercial partner engaged Allozymes to improve an enzyme for biosensing applications. They wanted to improve the sensitive toward specific compounds and establish a recombinant method to produce this enzyme. During the project scoping process, Pichia pastoris was identified as the most suitable expression organism. Although Pichia is not a common host for protein engineering campaign, we took on the challenge and successfully developed custom workflows to achieve both sensitivity and activity improvement in 6 months.

Pichia is an established platform for industrial-scale protein production; however, its low transformation efficiency and the tendency for multiple copy integration pose challenges for generating and screening protein variant libraries. To overcome these challenges, we developed a high efficiency Pichia transformation method and a deep sequencing workflow to identify hits (Fig. 1).

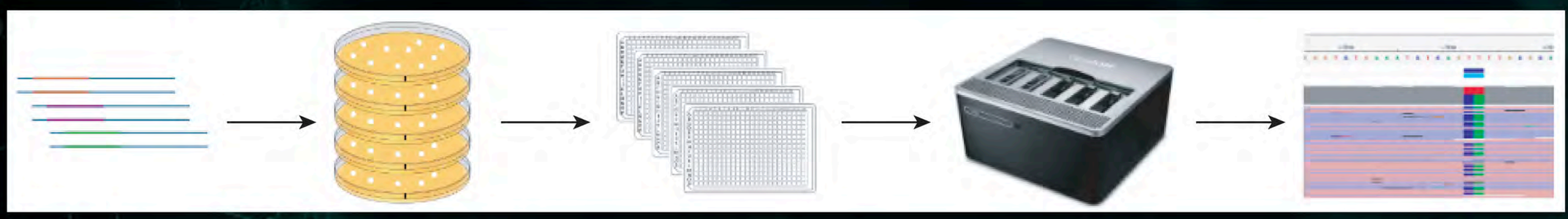

Figure 1. Pichia library generation and screening workflow.

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Enzyme for Biosensing Application

Since the enzyme is known to have very low expression in mammalian cells or Pichia, we first conducted expression optimization via cassette design, such as strain selection, secretion peptide screening, and promoter screening. 5-fold improvement in Pichia supernatant activity was achieved in 3 weeks.

For the screening method development, we collaborated with the partner to create a mid-throughput plate-based method (<1000 clones/day), which was directly translatable to their biosensing application. To accelerate the project, we also developed a proprietary microfluidic method to screen 50,000 cells in 1 day (Fig. 2).

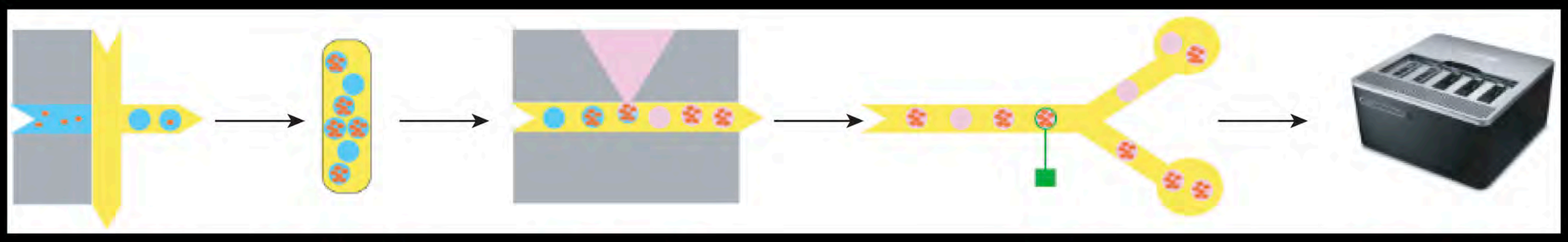

Figure 2. Microfluidic screening workflow

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Enzyme for Biosensing Application

We identified 10 hotspots based on the scanning library screening result, and then created 5 combinatorial libraries to consolidate these hotspots together. The resulting combinatorial libraries were screened via plate-based and microfluidic screening. In the end, we achieved 150-fold improvement in enzyme activity in Pichia supernatant, and 3-fold improvement in biomolecular inhibitory constant, ki (Fig.3).

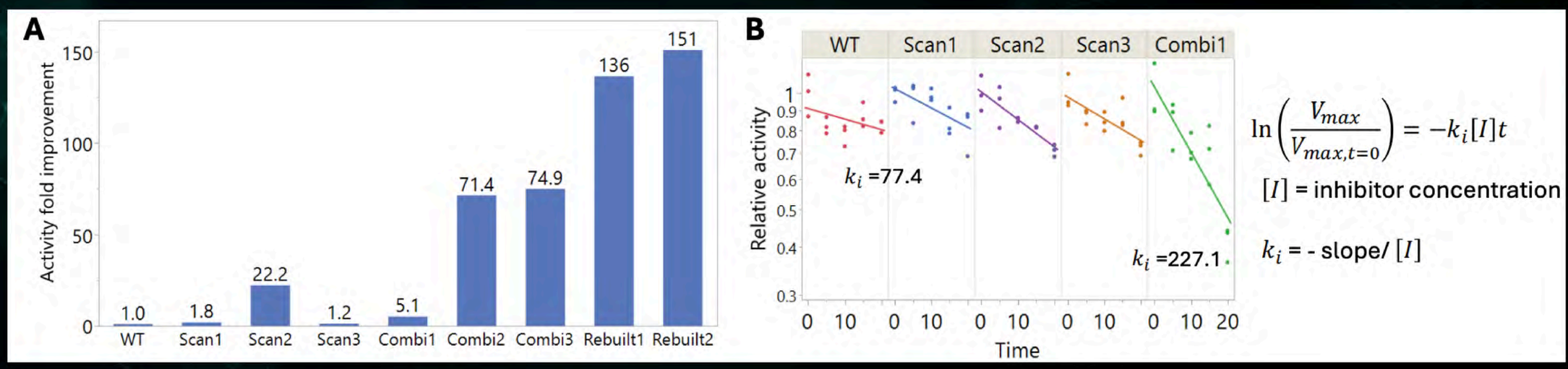

Figure 3. A) Activity of clones from different steps of the project. (B) Enzyme activity decreased over 20 mins of incubation with the inhibitor. Higher ki indicates higher sensitivity toward the inhibitor.

Allozymes has developed a high-throughput Pichia protein engineering platform and successfully improved the activity and sensitivity of an enzyme within 6 months. Since there is no recombinant source of this enzyme currently available on the market, this achievement paves the way for commercialization opportunities.

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Ready to explore how Allozymes can help you achieve your sustainability goals?

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VP of Business Development

Join us at CPHI to discuss your specific needs and discover the power of biocatalysis.