IMPERAGEN
DIGITAL ENZYME EVOLUTION™

ENZYME ENGINEERING REDEFINED

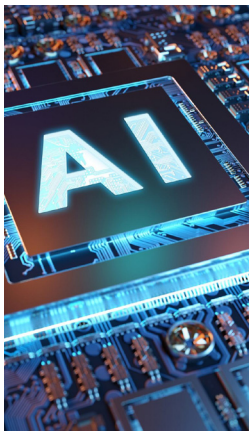
Accelerating enzyme innovation with an **AI-powered** and fully digitalised platform.

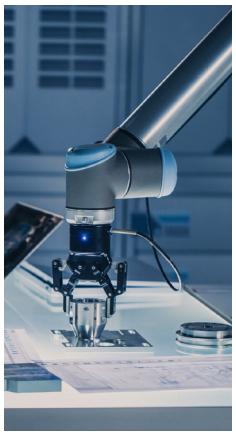
The Need for Speed

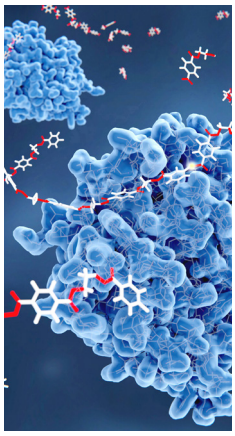
Enzyme technology has enormous potential, with applications ranging from cleaner, more efficient chemical manufacturing processes to new diagnostic tools and therapeutics.

However, despite this promise, current approaches to developing high-performance enzymes are inefficient and time-consuming, making them incompatible with current market timelines.

To realise the full potential of enzyme technology, a dramatically better solution is needed.







Digital Enzyme Evolution™

Imperagen are reinventing enzyme engineering from the ground up with a truly innovative platform that overcomes previous inefficiencies and addresses the market needs of speed, capacity, and scalability.

We combine patented advances in AI, precision DNA editing, and laboratory automation in a single platform to accelerate enzyme engineering. We call it Digital Enzyme Evolution™.

Our unique approach can be used across multiple enzyme classes, designed to target valuable key performance parameters simultaneously, such as reaction yield, stability, and substrate selectivity.

Predict Rapid AI-powered hotspot identification

Our chemical intelligence quickly identifies the parts of enzymes that are crucial for performance even before experiments. Proprietary physics-based algorithms, AI, and high-performance computing allow us to home in on hotspots, tackling multiple parameters, to reach a truly breakthrough speed in enzyme development.

Create Precision DNA builds

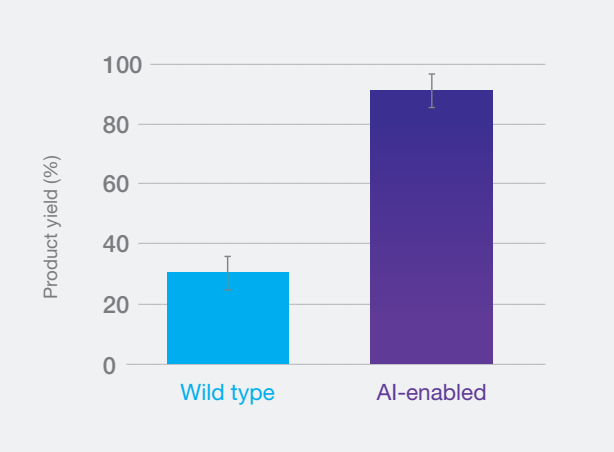
Our generative gene design and smart DNA library process uses the AI predictions to create variants that are simultaneously optimised for assembly, mutation, and expression, increasing the speed and reliability of the screening process.

Automate Accelerate through automation

Every step of our process has been reimagined to create a fully automated and digitalised laboratory workflow. Our integrated robotics platform makes previously long and complex protocols routine and reliable, enabling successful results in weeks, not months.

CASE STUDIES:

AI PREDICTION OF HOTSPOTS TO IMPROVE MULTIPLE PERFORMANCE PARAMETERS



Situation

From our enzyme panel, we discovered an imine reductase that can perform direct synthesis of a novel pharmaceutical in a single biocatalytic step, with excellent chiral selectivity, but with only a 30% product yield.

Results

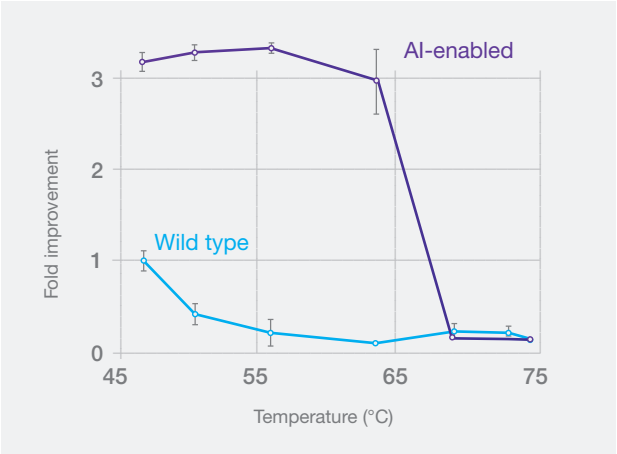
We used our chemical intelligence and AI technology to model and predict just 16 enzyme hot spots to target. From this, a small library containing just 1500 variants was constructed, from which we quickly identified a superior combinatorial variant with a 3-fold increase in performance and over >90% product conversion (10 g/L substrate loading).

Situation

Engineering enzymes towards new substrates and improving process stability are both key parameters of value to industrial biocatalysis. We characterised a unique amine oxidase with desirable enantioselectivity and identified a valuable alternative substrate compound for the enzyme. However, reaction rates and yields were low, even after prolonged incubations.

Results

Our chemical intelligence and protein stability algorithms identified 100 hotspots to target and a smart library of 500 variants was created. We rapidly identified a variant that showed a 3-fold improvement in activity towards the new substrate combined with an elevated thermostability of over 15°C.



Do you have an enzyme that would benefit from rapid improvement? **Get in touch.**

A state-of-the-art solution designed to meet market needs

Unparalleled speed

Reduce the need for upfront experimental data and get to performance improvements sooner. Combining AI with automation, our solution is optimised for efficiency at every stage.

Total flexibility

Our method can be applied across a diverse range of enzyme classes and target multiple performance parameters including turnover, stability, and expression.

Seamless scalability

Fully digitalised across the entire computational and experimental workflow, our platform makes the process routine and dependable, with capacity to handle multiple projects at once.

Discover how we can quickly transform your enzyme needs into market-ready solutions:
contact@imperagen.com

imperagen.com