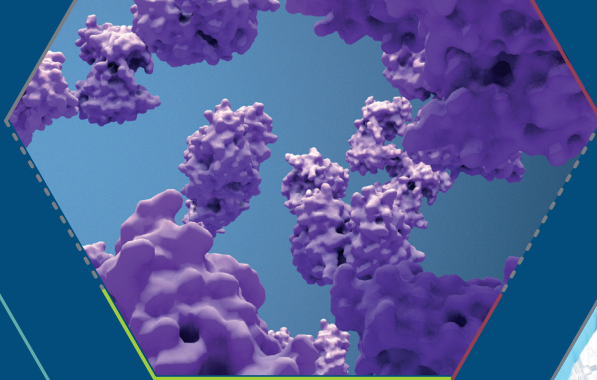


SOLUTION OFFERING



# Biotransformation

Development, application,  
and scale-up of enzymes for  
use in manufacturing



 **CASYM**CHEM



Asymchem's biocatalysis technology platform is here to support your projects at every stage, from discovery, screening, and evolution, to immobilization and fermentation of new enzymes for a complete arsenal of industrial applications.

**At Asymchem, we have successfully developed highly active engineered enzymes for the commercial production of a wide range of therapeutics, including statins, glitazones, penems and many more**

Asymchem has comprehensive biotransformation capabilities and extensive experience harnessing our expertise to satisfy customer needs, providing greener processes that don't just reduce supply and cost risks, but environmental impact as well.

## Biotransformation Offerings

A large variety of highly active engineered enzymes have been used in the commercial production of API's and Intermediates. Our experts can design, optimize and screen enzymes (biocatalysts) based on each project's specific demands. Biotransformation (enzyme catalysis) is foundational to our manufacturing approach, guaranteed to meet GMP standards, and flexible enough to produce quantities from mg to multi-ton manufacturing scale.

### Enzyme screening

- Enzyme library
- Enzyme screening kits
- High throughput screening of enzyme libraries
- 1-3 weeks for enzyme screening

### Enzyme Engineering

- Enzyme evolution/immobilization
- 2-6 months for enzyme evolution
- Max enzyme improvement >1000000 folds

### Enzyme Production

- Fermentation at scales up to 10,000 L/week
- 5000 L GMP fermentation
- High quality enzyme powder on scales from gram to ton

### Enzyme Library

**Our Enzyme Library contains over 2300+ enzymes and Includes:**

Ketoreductase  
Transaminase  
Hydrolase (lipase & esterase)  
Amino acid dehydrogenase  
Nitrilase  
Ene reductases  
Baeyer-Villiger Monooxygenase  
Imine reductase  
Phenylalanine Ammonia Lyase  
Proline hydroxylase  
Threonine aldolase  
Arylmalonic decarboxylase  
Tyrosine phenol-lyase  
Hydroxynitrile lyase  
Monoamine Oxidase  
Amidohydrolase(Amidase & Acylase)  
Epoxyhydrolase  
Phosphorylase  
Ribokinase  
Phosphopentomutases  
Adenosine deaminase

# Immobilization Solutions

Our immobilization platform is customized for enzymes with the purpose of suitability, scalability and economics in a manufacturing process, helping to enhance efficiency in integrated biotransformations.

Our platform offers six carrier immobilization methods, with 60 immobilized carriers, as well as three carrier-free methods, capable of supporting a wide range of projects.

You benefit from:

- Capability from gram to kilo scale, offering standard and customized platforms
- Expert analytical development and operational stability testing
- Single enzymes / Multiple enzymes / Co-enzymes/cofactors
- 3 kinds of continuous flow reaction mode: PBR / CSTR / RBR

## Fermentation & Downstream Expertise

Asymchem has state-of-the-art fermentation & downstream processing (DSP) capabilities, which allow us to offer timely, high-quality service that seamlessly integrates with your processes.

### Fermentation Expertise

- Broad fermentation infrastructure, ranging from 5L to 5,000L
- Scalable fermentation process from lab scale to production scale with maximal yield and protein expression
- Experience handling recombinant E.coli strains across difficult protein expression projects, as well as production from *Pischia pastoris* platform

### Downstream Expertise

- Unique and scalable DSP platform for unstable and sensitive recombinant protein isolation, from lab to production scale
- Production of lyophilized enzyme powders and immobilized enzymes from bench to commercial scale
- Specialized GMO-free production of enzymes

10+

Years experience  
in developing  
scalable  
bioprocesses

150+

Biotransformation projects in  
development and production.  
biotransformation projects  
in development  
and production.





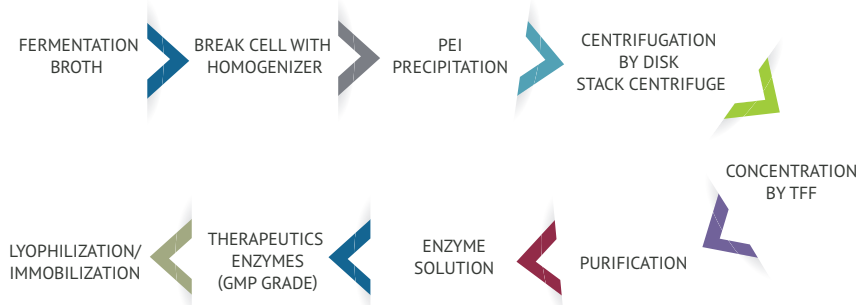
# In-house Enzyme Manufacturing

We manufacture all of our enzymes in-house for a number of key reasons:

- Minimize loss of activity during transportation process
- Optimize the cost-efficiency of enzyme production
- Enhance control of the supply chain and operational freedom

Manufacturing in-house means we can add value by proposing specific improvements in the chemistry based on our experience, enabling us to deliver solutions that can seamlessly integrate into your real-world pharma processes.

We have our own Enzyme Library, comprising wild-type enzymes in the public domain and engineered enzymes produced by directed evolution at Asymchem..



**Biotechnology empowers chemical reactions - from the discovery of synthetically useful enzymes to integrated solutions for biotransformation applications.**

## KNOW. HOW.

**Let Us Deliver For You**

Asymchem offers market-leading drug product development support today while continually driving new innovations to give you a greater advantage tomorrow.

To see what our know-how can do for you and learn more, contact us at [innovation@asymchem.com](mailto:innovation@asymchem.com)

## An Expert Team

The majority of our 150-strong biotransformation team have a postgraduate degree, many of whom are specialized in enzyme engineering and biotransformation optimization.

With this specialist support, we're well-equipped to solve your biocatalysis challenges, whatever they may be.