AI-Protein Engineering

*ai*Protein®

RevoAb™ Special Edition

RevoAb™ brings *ai*Protein®'s core technology to you with ease
Early access available until March 2026

*ai*Protein®: RevolKa's innovative Machine Learning–driven protein engineering platform

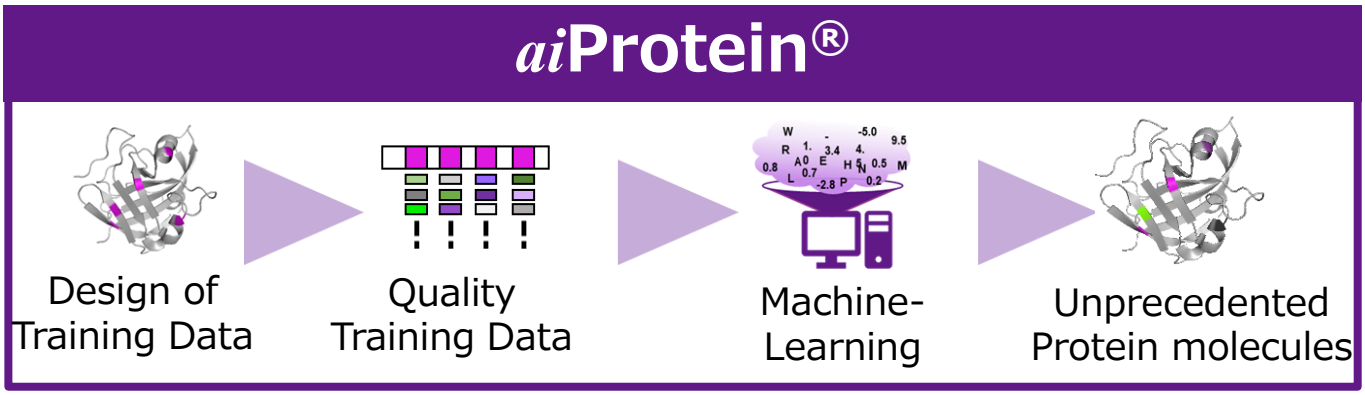
RevolKa

This service optimizes antibody properties, including protein yield (host expression levels), thermal/structural stability, solubility and more at little cost of antigen-binding potencies (affinity). The optimization is powered by RevolKa's advanced artificial-intelligence (AI)-driven protein engineering platform, *ai*Protein®. This innovative AI technology designs high-performance antibodies with a high probability of success. This service also offers multi-property optimization and supports a wide range of antibody modalities, including monoclonal IgG, scFv, and VHH can be optimized. Antibody humanization, as well as affinity recovery after humanization is also available.

◆*ai*Protein®: RevolKa's innovative AI–driven protein engineering platform

1. Design of Training Data set customized to a target protein
2. Quality Training Data by RevolKa's Wet capability
3. Low-N、Fine-tuned Machine-Learning technology

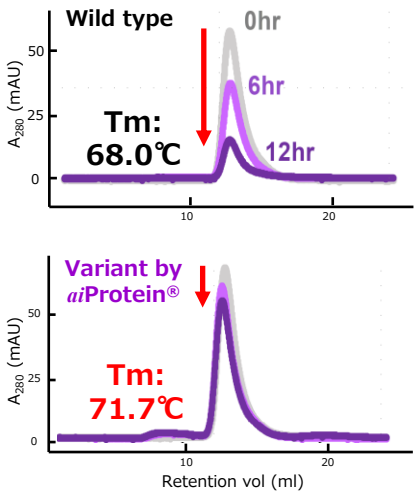
= Unprecedented Protein molecules for Industrial Use



◆Case studyies of *ai*Protein ® Full-Package Service

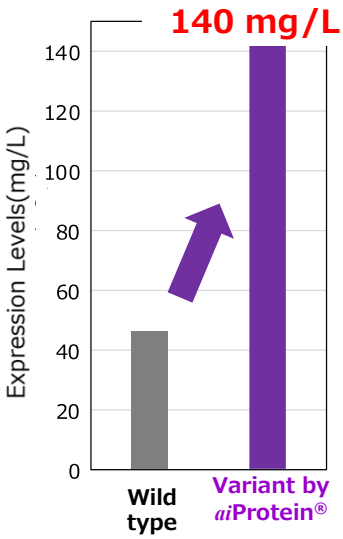
Case Study(1) : Improved Expression and Stability of nivolumab

Improved Stability



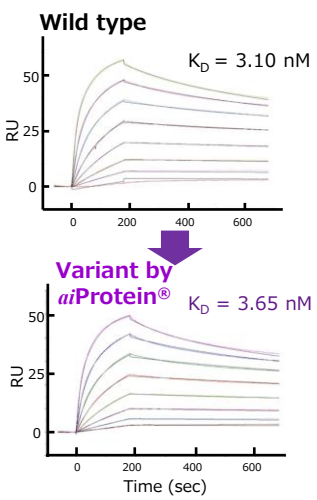
Thermal stability of nivolumab and an *ai*Protein®-optimized variant were tested at 60 °C for 0, 6, and 12 hours. Size-exclusion chromatography (SEC) analysis demonstrated extremely high stability of the *ai*Protein® variant.

Increased Expression Levels



The nivolumab variant achieved a yield of 140 mg/mL (3-fold higher than nivolumab) in a transient Expi293F mammalian cell secretion system.

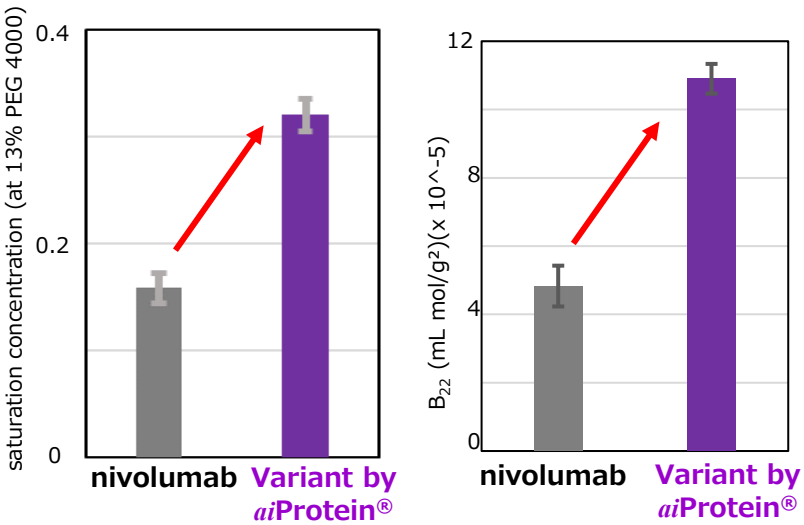
Protected Affinity



Nivolumab and the variant showed a comparable antigen binding and dissociation constant values in a surface plasmon resonance analysis.

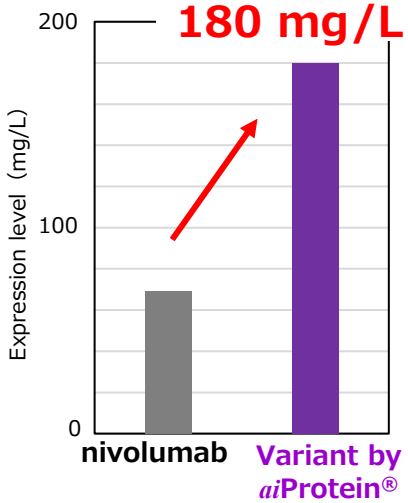
Case Study(3) : Improved Solubility and Yield of nivolumab

Enhanced Solubility



Solubility of monoclonal antibody was tested by a polyethylene glycol (PEG) method. A nivolumab variant generated by *ai*Protein® showed higher saturation concentration under a 13% PEG condition compared to nivolumab (left). Consistent with this result, second virial coefficient(B_{22}), representing protein colloidal stability, was also higher for the variant than that of wild-type (right), suggesting that the variant can be potentially formulated at a high concentration. The binding affinity of the variant was comparable to that of wild-type.

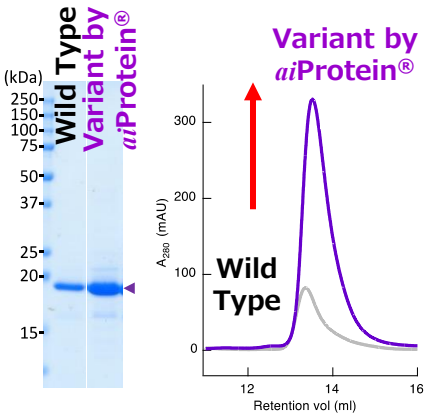
Increased Expression Levels



The nivolumab variant antibody achieved a yield of 180 mg/L (3-fold higher than nivolumab) in a transient Expi293F mammalian cell secretion system.

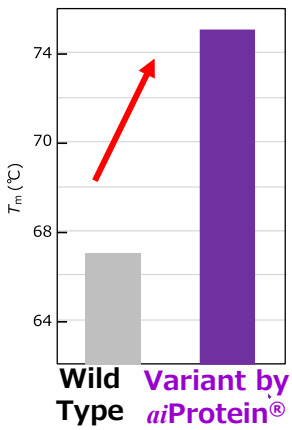
Case Study(3) : Improved Expression and Stability of humanized VHH

Increased Expression levels



A variable heavy domain of heavy chain (VHH) that showed severe aggregation after humanization was optimized by by *ai*Protein® to improve yields in *E.coli* BL21(DE3) due to aggregation issues. The variant VHH exhibited a significant increase in yields (Left) and monodispersity in size-exclusion chromatography analysis.

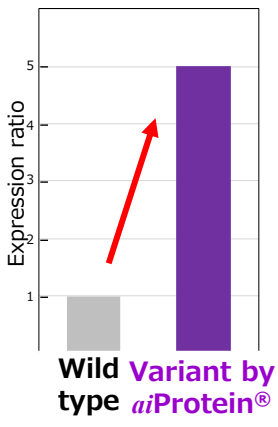
Improved Stability



Denaturation temperature (Tm), representing structural stability of the protein, was measured using a thermal shift assay. The variant VHH generated by aiProtein® exhibited a significant increase in thermal stability of 6 °C.

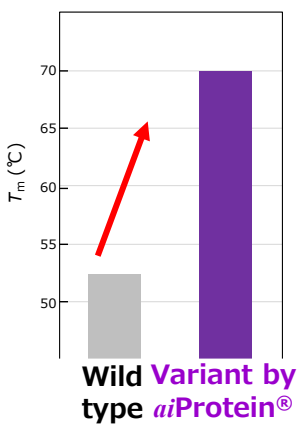
Case Study(4) : Improved Expression and Stability of Diabody

Increased Expression Levels



A difficult-to-express diabody was optimized by *ai*Protein® to improve yields in *E. coli* BL21(DE3).
Quantitative SDS-PAGE analysis showed a 5-fold increase in yield for the aiProtein®-generated variant.

Enhanced Stability



Denaturation temperature (Tm), representing structural stability of the protein, was measured using a differential scanning calorimetry assay. The variant VHH generated by *ai*Protein® exhibited a significant increase in thermal stability of more than 15 °C.

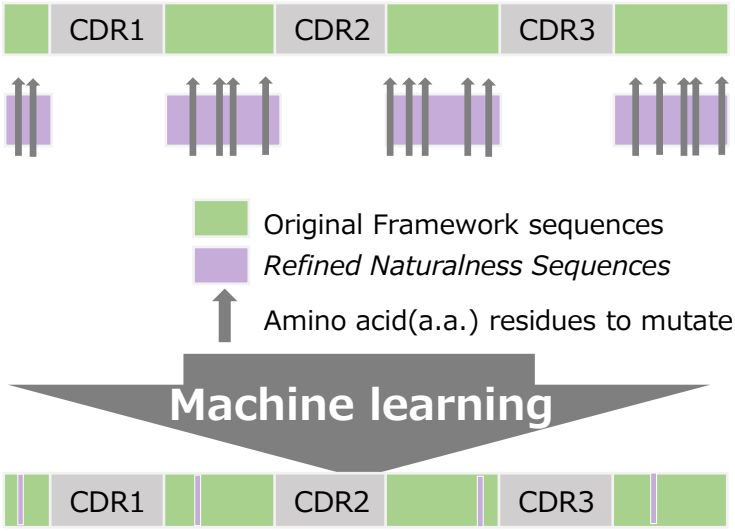
◆Core Technologies of *ai*Protein®

Core Technology -1

Framework Engineering driven by Refined Naturalness Design

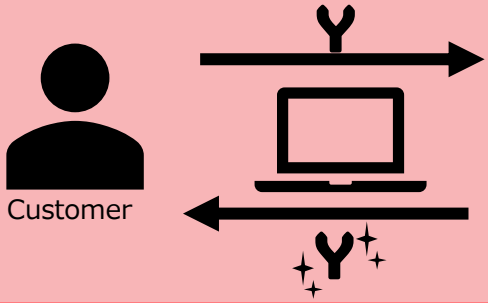
Core Technology -2

Low-N Machine Learning as few as 100 Training data



Generates promising antibody sequences with optimized mutations

Bringing *Core Technology -1* to You



RevoAb

Early access available until March 2026

All you need
Submit target sequence

What you can get
Up to 3 designs*1 for
- Enhanching Developability
- Protected Affinity

Design concept
Engineering Frameworks driven by Revolka's Refined Naturalness Design

Delivery
≦ 2 weeks*2

Pricing
≦$700

IP
Remain with you

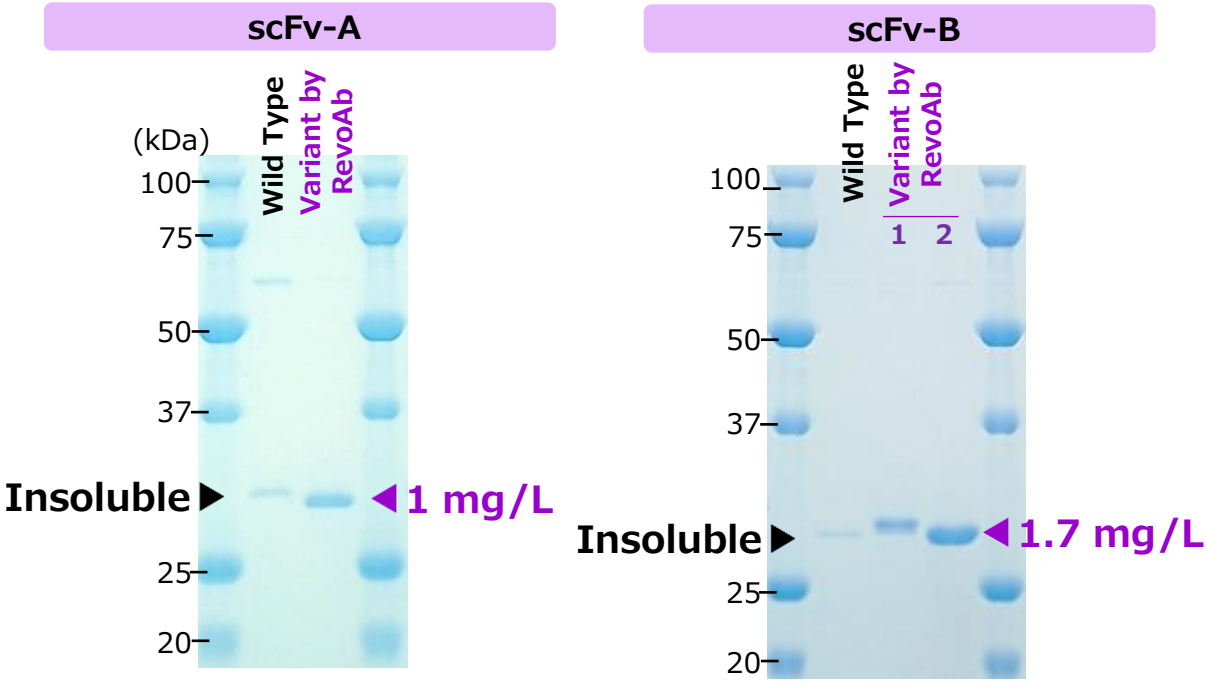
Confidentiality
CDR-Free design

*1)May be fewer than three depending on the target *2) May vary depending on the circumstances

◆ RevoAb™ : Case Study

Improved Expression of Difficult-to-express scFv

Two examples of scFv（left : scFv-A、right : scFv-B）



Two difficult-to-express single-chain variable fragments (scFvs): scFv-A (left) and scFv-B (right), were optimized by *ai*Protein® to improve yields in *E. coli* BL21(DE3). The scFv-A and scFv-B variants generated by ® (scFv-A: 1 variant, scFv-B: 2 variants) exhibited a significant increase in yields. Binding affinity to the antigen of the two scFv-B variants was comparable to that of the wild-type. Affinity of the scFv-A variant was not tested.

◆ RevoAb™ + aiProtein®: A Complete Antibody Optimization Pipeline

RevoAb™ identifies the candidate mutations, then *ai*Protein®'s AI finds the perfect combinations for next-level antibody performance!

✓ **Next-Gen, Multi-Properties Optimization**

10% OFF for projects with the same antibody as RevoAb™!

Don't miss your chance!

Request Form : RevoAb : Request Form

Contact us : support-revotune@revolka.co.jp

FAQ : https://revoab.revolka.com/

◆ Flow of *ai*Protein ® Full-Package Service

Stability Optimization | Expression Level Optimization | Affinity Recovery | Customized service

01 Initial consultation for Experimental plan and Estimates

02 Design of antibody variants for AI training, and Collection of training data

03 Building an AI-machine specifically designed for the customer's antibody with the training data
Generation of optimized variant sequences to test

04 Selection of candidate variants to report (approximately 5 variants)

Option Validation of the candidate variants

Delivery of the report including deliverables

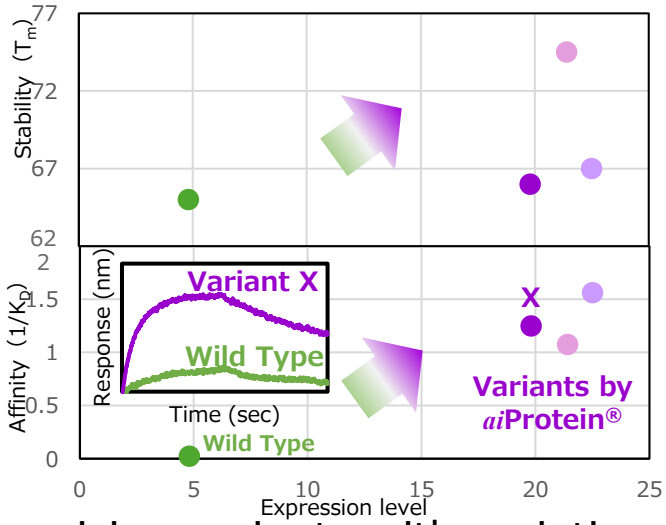
Service and Deliverables

- A preliminary technical consultation will be placed before starting a project to share customer's antibody information and properties of interest.
- The lead time from the submission of the customer's antibody protein sequence to the delivery of optimized antibody sequences is 8 to 11 months depending on requirements in experiments, such as protein expression system.
- The deliverables include approximately 5 protein sequences of optimized variants and experimental data regarding improved properties. All of the variants will be experimentally validated by RevolKa.

◆*ai*Protein®: ML-guided-Versatile, Multi-Properties Engineering

*Please note that the following examples are outside RevoAb™'s scope. For inquiries, kindly contact RevolKa. biz-contact@revolka.co.jp

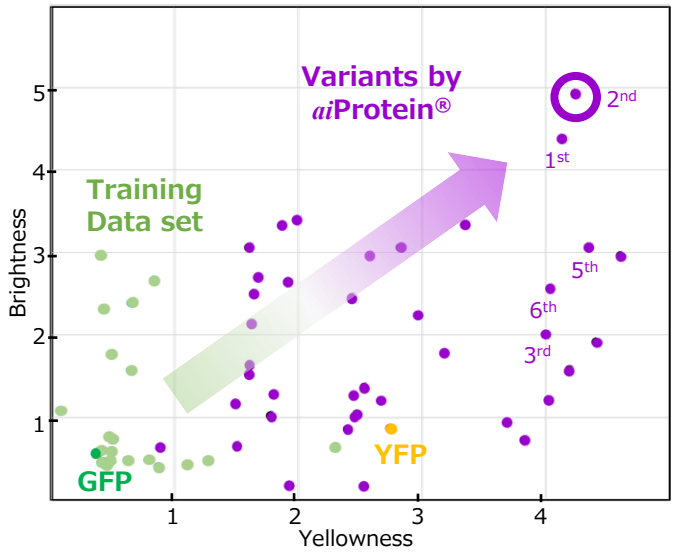
Case Study(5) : Improved Affinity, Expression and Stability of Anti-COVID-19 Antibody (VHH)



Promising variants with variations in affinity, Stability, and yield

Ito et al., unpublished data

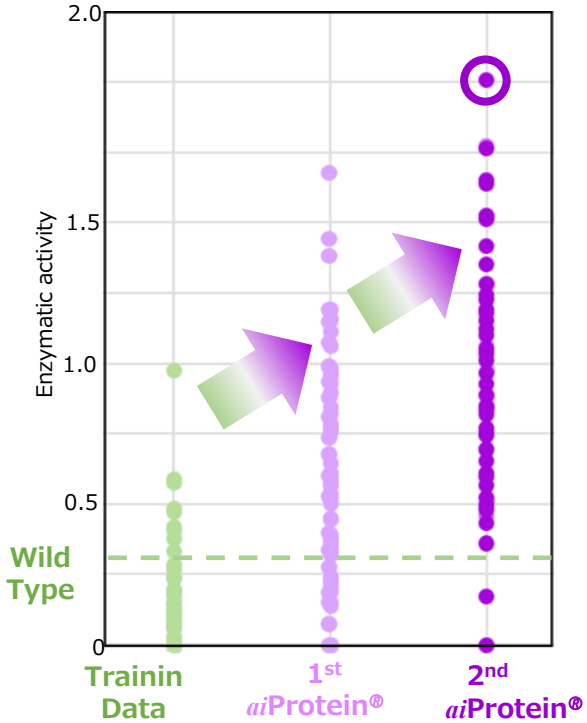
Case Study(6) : A 30-year variant, created in 7 days



Dramatic improvement through prediction of all variants

Saito, Y. et al. (2018) ACS Synth. Biol. 7, 2014-2022. DOI:10.1021/acssynbio.8b00155.

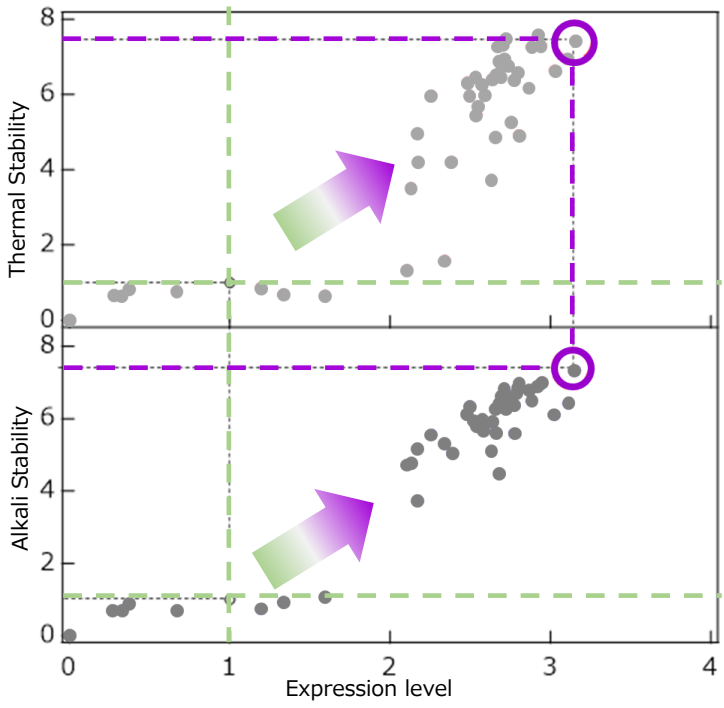
Case Study(7) : Improved Expression and Stability of SortaseA



6× Higher Activity with Improved Expression

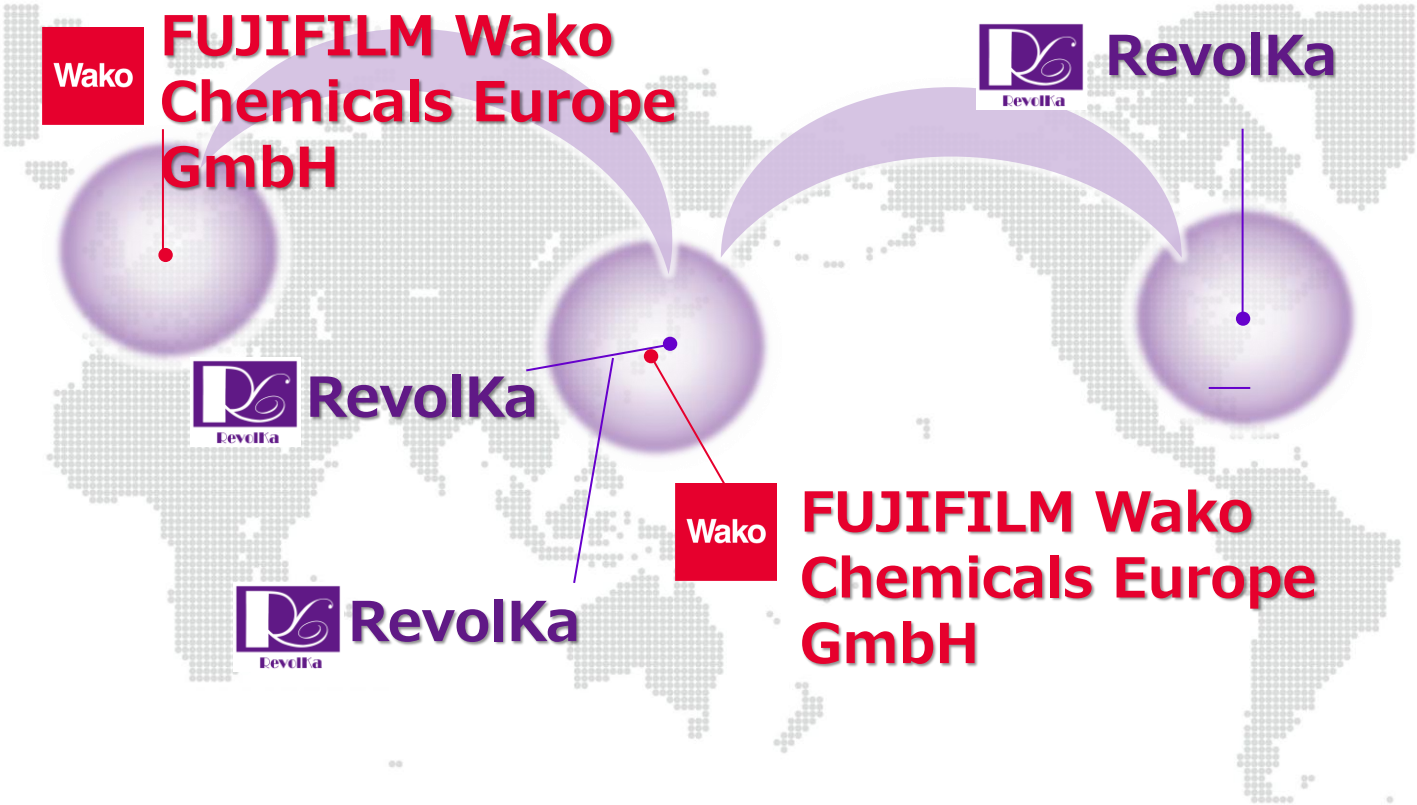
Saito, Y. et al. (2021) ACS Catal. 11, no. 23, 14615–14624. DOI:10.1021/acscatal.1c03753

Case Study(8) : Improved Expression, Thermal and Alkali Stability of industrial enzyme



3.3× Expression,
7.5× Thermostability,
7.5× Alkali Stability

◆Contact



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Value from Innovation

Wako

United States

US : https://labchem-wako.fujifilm.com/us/category/95358.html
EU : https://labchem-wako.fujifilm.com/europe/category/95358.html

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