

## Expression and Purification of trypsin-like serine protease

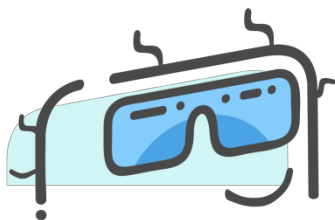
### Gene and Expression Vector

#### 1.1 Gene coding for the target protein

The cDNA coding for the target protein was chemically-synthesized with optimization for expression in *E.coli* and described as below.

##### >5\_trypsin-like\_serine\_protease-1050 bp

atgtcccctatactagggttattggaaaattaagggccttggtgcaaccactcgacttcttttgaatatct  
tgaagaaaaatatgaagagcatttgatgagcgcgatgaaggtgataaatggcgaaacaaaaagtttgaa  
ttgggtttggagtttcccaatcttccttattatattgatggtgatgttaaattaacacagtctatggccatcac  
gttatatagctgacaagcacaacatgttgggtggtgtccaaaagagcgtgcagagatttcaatgcttgaag  
gagcggttttgatattagatacgggtgttcgagaattgcatatagtaaagactttgaaacttcaaagttgat  
tttcttagcaagctacctgaaatgctgaaaatgttcgaagatcgtttatgtcataaaacatatttaaagtgtgat  
catgtaaccatcctgacttcatgttgatgacgctcttgatgtgtttatacatggaccaatgtgcctggat  
gcgttcccaaaattagttgttttaaaaaacgtattgaagctatcccacaaattgataagtacttgaaatccagc  
aagtatatagcatggcctttgcagggctggcaagccacgtttggtggtggcgaccatcctcaaaaatcgga  
tctggtccgcgtGGATCCTGGCTGTTTCAGCTGCAGCGCCAGCGATTTTCAGTGCAGCAA  
CGGCAACTGCATTCCGGGTAGCTGGGAGTGCGATGGTGAAGCCGATTGCAGCGATG  
GTAGCGATGAGGCCAGCTGCAGCGGCGGTGGCACCTGCCAGCAGGGCGTGCACTT  
CTTTTGCGCGAACGGTCTGTACTGCATTGATAGCAACTGGGTGTGCGACGGCGATAA



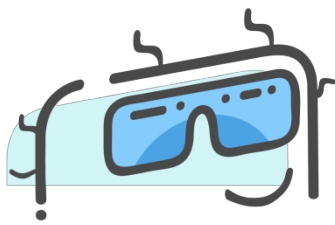
CGACTGCGGTGACATGAGCGATGAACAGAATTGCGGTGGCGGTAGCACCGGTACCA  
CCGGTACCACCGCTCCAATCACCAGCTTCACCGGCGACTGCGGTCAGCCAGCCATT  
AGCCCGCAGAACGTGCGTGTGGTGGGCGGTGTGCAGGCTGTGCAGGGCAGCTGGC  
CATGGCAGGCCAGCCTGAAGCTGTATGGCGGTACAGTGTGCGGCGGTGAGATCATT  
GCGCCAAACTGGATTGTGACCGCGGCCCACTGCGTGGATGGTCAGAGCAATCCGAG  
CCAGTGGCGCGTGAGCCTGGGTAGCCATCGTCGCACCAGCACCGACAGCACCCAG  
CAGGATTTGAGCGTGACCCGTATCATTATGCACGAGAGCTACGATAGCAACCGCATC  
AACAACGACGTGGCGCTGATGAACTGAGCGGCAACGCTCAGTTTAACAACATATGT  
GAGCCCGATTTGCCTGCCGACCCAGGATGTGGCTGCCGGTACCAACTGCGTGACCA  
CCGTTGGGGTGACACCGGCAGCGGTGCTAGCACCTACCTGATGCAGGCCACCGTG  
CCGATCATGGAATGGAACAAGTGCAACAGCGCCAGTACATGAACGGCGCGATCAC  
CGATAAGATGATTTGCGCGGGTTATGACCAGGGCGGTAAAGATGCGTGCCAGGGCG  
ACAGCGGCGGTCCACTGGTGTGCAACTACAGCGGCAAATGGACCCTGGACGGTATT  
GTGAGCTGGGGCTATGTTGCGCGCAGGCTTACAAGCCGGGTATCTATACCCGTGTG  
ACCCAGTTTGTGAGCTGGATTAACAACAAAATGGCGAGCAACTAACTCGAG

## 1.2 Expression vector

The cDNA sequence described in the §1.1 was cloned in pGEX-6P-1 expression vector.

### >5\_trypsin-like\_serine\_protease (571AAs,62.8kDa, pl:5.06)

MSPILGYWKIKGLVQPTRLLLEYLEEKYEEHLYERDEGDKWRNKKFELGLEFPNLPY



YIDGDVKLTQSMAlIRYIADKHNMLGGCPKERAElSMLEGAVLDIRYGVSRlAYSKDFETL  
KVDFLSKLPEMLKMFEDRLCHKTYLNGDHVTHPDFMLYDALDVVLYMDPMCLDAFP  
KLVCFKKRlEAIPQIDKYLKSSKYlAWPLQGWWQATFGGGDHPPKSDLVPRGSWLFSCSA  
SDFQCSNGNCIPGSWECDGEADCSDGSDEASCSGGGTCQQGVHFFCANGLYCIDSN  
WVCDGDNDCGDMSDEQNCGGGSTGTTGTTAPITSFTGDCGQPAISPQNVRVVGGV  
QAVQGSWPWQASLKLYGGHVCGGQlIAPNWIVTAAHCVDGQSNPSQWRVSLGSHR  
RTSTDSTQQDFSVTRIIMHESYDSNRINNDVALMKLSGNAQFNlNYVSPICLPTQDVAA  
GTNCVTTGWGDTGSGASTYLMQATVPIMEWlNKCNSAQYMNGAITDKMICAGYDQ  
GGKDACQGDSGGPLVCNYSKGWTLDGIVSWGYGCAQAYKPGlYTRVTQFVSWlNNK  
MASN

Features: GST tag:[1:218]

## Expression Tests

### 2.1 Aim

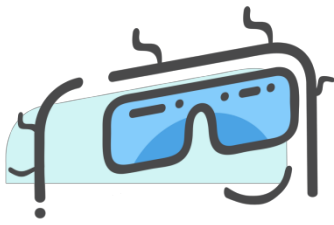
-Determination of optimal conditions for protein expression by evaluation of:

\*Induction strategy

\*Temperature and time for induction

\**E.coli* strain used for protein production

-Identification of best extraction condition: native or denatured



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## 2.2 Short protocol description

-Culture:

- \*Bacteria starter obtained by incubation at 37°C

- \*IPTG induction with different temperatures and incubation times (see details in §2.3).

-Protein samples preparation (for each expression condition tested):

- \*Bacteria harvested by centrifugation

- \*Lysis with native buffer

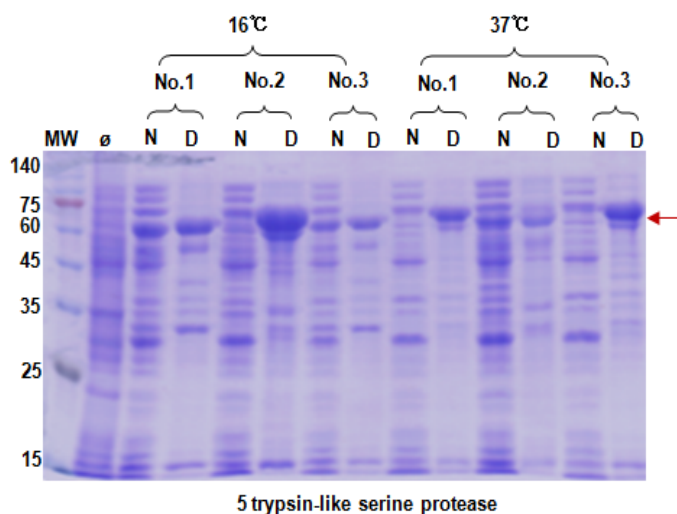
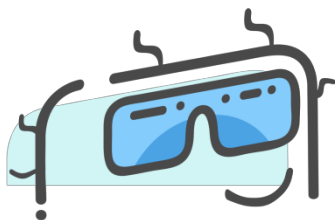
- \*Clarification (centrifugation C1): The supernatant is the native protein extract (NPE)

- \*Solubilization of the pellet from C1 with a denaturing buffer (Urea 8M)

- \*Clarification (centrifugation): The supernatant is the denatured protein extract (DPE)

- \*PAGE analysis of NPE and DPE.

## 2.3 Results of the expression tests



**Figure 1. Expression tests of the target protein.** Analysis of NPE and DPE prepared as described in §2.2.

**MW.** Molecular weight marker. **Ø.** Non-induced bacteria culture (negative control).

**+**. Western blot internal control (Unrelated His-Tagged protein).

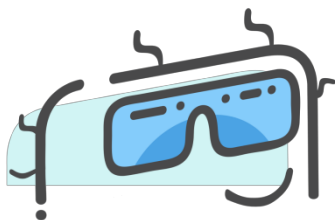
**16 and 37.** Incubation temperature (°C) during induction with IPTG.

Induction with IPTG 1mM during 16h at 16°C, or during 4h for other temperatures.

## 2.4 Conclusion of the expression tests

**Note:** *E.coli* strains tested are intended to overcome one or several expression issues such as (but not limited to) expression level, solubility or toxicity.

Optimal expression condition was described as below.



	Strain No.	Temperature	Induction Time
<b>5 trypsin-like serine protease (DPE)</b>	No.2	16°C	16h

**Table1. Optimal native expression conditions of target protein.**

## ● Small-scale purification tests

### 3.1 Aim

200mL purification tests in NPE&DPE conditions for target protein. Starting material: NPE&DPE prepared after production in optimal native expression conditions described in the Table 1.

### 3.2 Short protocol description

For native purification,

Purification by affinity vs. GST-Tag on GST resin

-Wash: 50 mM Tris-HCl pH 8.0, 150 mM NaCl

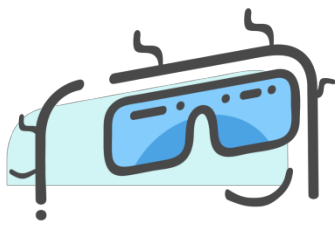
-Elution: 50 mM Tris-HCl, 150 mM NaCl, 15 mM reduced Glutathione

-After purification, the samples of interest are buffer exchanged vs. TBS  
pH8.0

For denatured purification,

-Lysis buffer: PBS, pH7.5, 10% Glycerol

-Washing buffer: PBS, pH7.5., 1% Triton X 100, 5 mM EDTA



-Denaturing buffer: PBS, pH7.5, 8M urea (or 2%NLS)

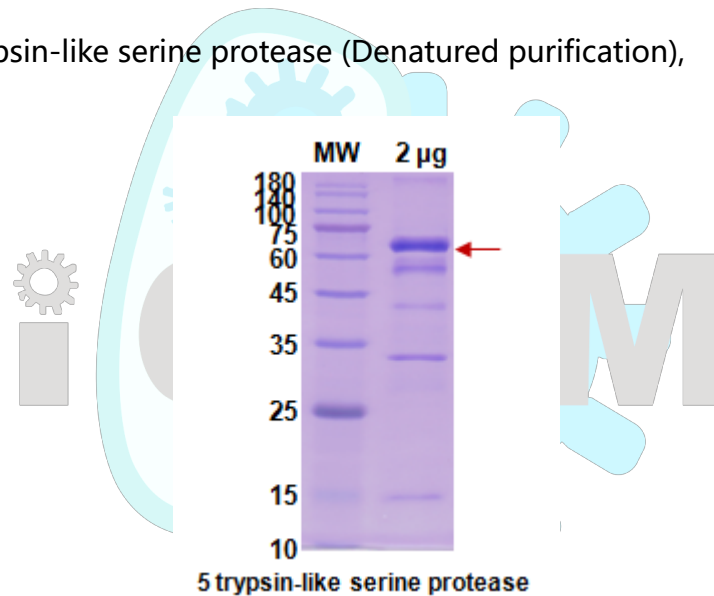
-Dialysis buffer: PBS, pH7.5, 8M urea (or 0.2%NLS)

-Analysis by SDS-PAGE of fractions of interest

-Final sample QC: qualitative by SDS-PAGE, quantitative by Bradford method.

### 3.3 Results of the purification tests

For 5 trypsin-like serine protease (Denatured purification),



**Figure 2. Final sample QC of denatured condition.** Coomassie blue staining.

Reducing-PAGE and WB analysis. 2µg of sample loaded.