



# Product Guide to Protein Biotechnology Solutions



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Smart- Lifesciences



Boyi Group



Boyi Biotech

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 [www.smart-biosciences.com](http://www.smart-biosciences.com)

# About Us



Smart-Lifesciences

## Your Integrated Protein Research Solutions Provider

Smart Lifesciences develops innovative scientific products and provides professional one-stop solutions. Our technology platform originated in chromatography and has been applied across the broad field of protein science—from protein preparation to purification, detection, and application development services. For large-scale manufacturing, our active DMF filings enable a seamless workflow to accelerate the translation of research.

## Our Portfolio Includes:

300+ Chromatography Resins

Professional CRO Technical Services

Reagents & Instruments for biomolecular preparation, purification, detection, electrophoresis, and blotting



# Your Integrated Protein Research Solutions Provider

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## CONTENT

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# 01

## Recombinant Protein Expression

- Vector
- Extraction And Amplification Kit
- Culture Medium

## Recombinant Protein Expression

Recombinant proteins are important tools in the study of biological processes. Commonly used protein expression systems include Escherichia coli, yeast, baculovirus, insect cells and mammalian cells. The key steps of protein expression include gene cloning, transfection, screening and expression.

### 1. Vector

Gene vectors are essential tools for delivering target genes into cells. They enable the introduction and release of genetic material, and in some cases, allow integration into the host cell nucleus to express specific functions. Based on their purpose, gene vectors are classified into cloning vectors and expression vectors. The pSmart™ series of expression vectors is compatible with systems such as E. coli and yeast, allowing users to choose the most suitable vector according to their experimental needs.

### 2. Extraction And Amplification Kit

To facilitate efficient molecular cloning workflows, we offer a comprehensive selection of nucleic acid recovery kits, including both column-based and magnetic bead-based purification systems, to streamline your experimental procedures. The DNA Assembly Cloning Kit allows you to directionally clone the inserted fragment into any site of any vector.



This SYBR Green I-based qPCR mastermix incorporates antibody-mediated Hot-Start DNA polymerase and an optimized buffer system designed for quantitative PCR applications. This enhances amplification specificity through precise thermal activation control while improving detection sensitivity for low-copy targets, providing broad linear quantification range and high reproducibility across experimental replicates. Containing standardized ROX reference dye for instrument signal calibration, this mastermix demonstrates full compatibility with mainstream qPCR platforms. The workflow simply requires addition of primers and template DNA, enabling rapid reaction setup within standardized thermal cycling protocols.

The DNA Assembly Cloning Kit is a simple, rapid and efficient DNA seamless cloning kit that can directionally clone the inserted fragment into any site of any vector. Linearize the vector in any way and introduce the sequence of the linearized vector end at the 5' end of the forward/reverse primer of the inserted fragment, so that the 5' and 3' ends of the PCR product carry the same sequence (25 - 40 bp) as the two ends of the linearized vector respectively. After the PCR product with vector end sequences at both ends and the linearized vector are mixed in a certain proportion, under the catalysis of recombinase, the reaction can be transformed at 50°C for 15 minutes to complete the directional cloning.



### 3.Culture Medium

For prokaryotic expression systems, exogenous gene expression typically requires induction. To simplify the operation, we can provide ready-to-use culture media. This culture medium does not require the addition of inducers after transformation, and it can be directly used for the preparation of culture media at the stage of inducing agent addition. For CHO eukaryotic expression systems, we provide a selection of serum-free media and feeds for your use.



Figure 1.1 Culture media suitable for prokaryotic expression systems (Left: Without inducer; Right: With inducer added).

#### Ordering Information

Category	Product Name	Catalog Number	Specification	Characteristic
Vector	pSmart I	SLP023	100ng/μl 10μl	SUMO Protein
	pSmart II	SLP024		IF2 Protein
	pSmart III	SLP025		Maltose-Binding Protein(MBP)
	pSmart IV	SLP026		NusA Protein
	pSmart V	SLP027		MsyB
	pSmart VI	SLP028		Strep tagII
	pSmart N 8His	SLP015		His (N-terminal)
	pSmart C 8His	SLP014		His(C-terminal)
Reagent	DL5000 DNA Marker	BR0013-01	500μl	Nucleic acid electrophoresis
	DL2000 DNA Marker	BR0012-01	500μl	
	4X LDS Loading Buffer	BR0010-01	1mL*10	
BR0010-02		500mL		
Reagent Kit	DNA Assembly Cloning Kit	BK0024-01	50 rxn	Molecular amplification
	HS Universal qPCR Master Mix,ROX plus	BK0015-01	5*1 mL	
	HS Universal qPCR Master Mix	BK0014-01	5*1 mL	
Culture Medium	Serum-Free Medium for CHO Cells	B25001	1L	Eukaryotic expression system
	Serum-Free Medium Feed	B25002	1L	
	LB Culture Medium	BR0124-01	250g	Prokaryotic expression system
	TB Culture Medium	BR0125-01	250g	
	2×YT Culture Medium	BR0126-01	250g	
	Autoinduction Medium for E. coli	BR0134-01	1L	Prokaryotic expression system Inducer has been added
BR0134-02		5*1L		

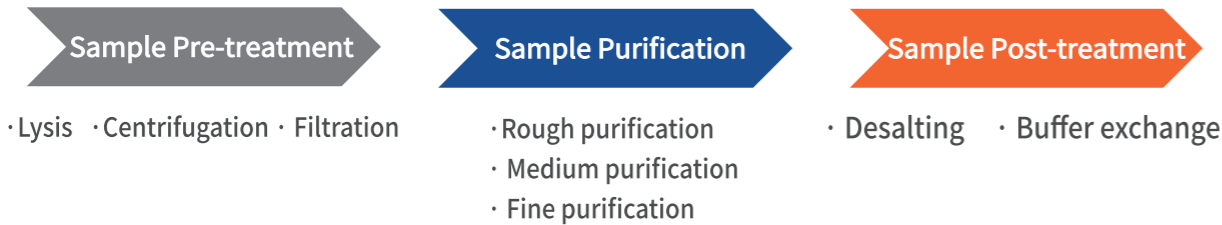
# 02

## Protein Purification

- Sample Pre-treatment
- Sample Purification
- Sample Post-treatment

# Protein Purification

Protein purification, the process of isolating specific target proteins from tissues, cells, or protein mixtures through extraction and purification techniques, yields proteins of high purity, activity, and yield. Effective purification reduces the impact of impurities on experimental results and ensures the consistency and reliability of biological products.



## 1. Sample Pre-treatment

For intracellular proteins, selecting an appropriate sample pretreatment method is critical to effectively disrupt cell walls and membranes, thereby releasing the target proteins. Common cell lysis techniques include enzymatic digestion, ultrasonic disruption, and mechanical shearing. Table 1 summarizes four types of lysis buffers, allowing users to choose the most suitable option based on experimental needs.

After lysis, the mixture of cell debris and protein solution is typically subjected to centrifugation to separate the supernatant from the pellet. For secreted proteins, centrifugation is also required to remove cells and collect the supernatant containing the protein of interest. However, the resulting supernatant may still contain small molecules and particulate impurities that can affect downstream purification. At this stage, further clarification through filtration—such as microfiltration, ultrafiltration, or nanofiltration—is recommended.

**Table 1: Comparison of Lysis Buffer**

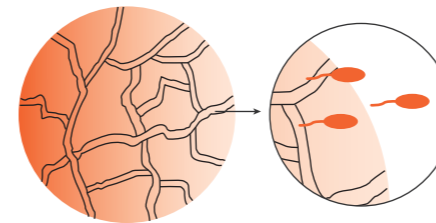
Product Name	TieChui E.coli Lysis Buffer	RIPA Lysis Buffer (Strong, Contains Inhibitors)	Universal Lysis Buffer	Cut E.coli Lysis Kit
Catalog Number	BR0005	BR0123	BR0127	SLR01401
Effective Lysis Components	Lysozyme, Non-ionic Detergent	Non-ionic Detergent, Anionic Detergent	Non-ionic Detergent, Anionic Detergent	Non-ionic Detergent
Lysis Intensity	Mild	Strong	Mild	Mild
E.coli Bacteria Lysis	Very Good	Good	Fairly Good	Very Good
Mammalian Cell Lysis	Good	Very Good	Fairly Good	Good
Membrane Protein Extraction	NO	Very Good	Good	NO
Nuclear Protein Extraction	NO	Very Good	Good	NO
Compatibility with Different Sample Types	Targeted E. coli	Very Good	Very Good	Targeted E. coli
Lysis Time	1-10min	1-10min	15min	5-10min
Contains Nuclease	Yes	NO	NO	Yes
Contains Nuclease	NO	Yes	Yes	NO
Contains Phosphatase Inhibitors	NO	NO	Yes	NO
Main Applications	Protein purification	WB, IP	WB, Protein purification, IP, COIP, pull down	Protein purification

## 2. Sample Purification

Protein purification generally consists of three steps: Capture, Intermediate Purification, and Polishing. Currently, Boyi has a complete purification product line, offering hundreds of resin and magnetic bead products. You can select appropriate purification products based on factors such as the properties of the protein to be purified and downstream application requirements (For detailed product information, please refer to the Chromatography Packing Selection Guide by Smart-Lifesciences).

### 2.1 Chromatography Resins

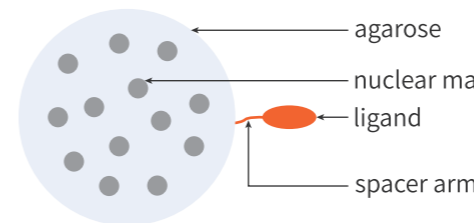
#### 2.1.1 Select appropriate microsphere materials according to experimental conditions



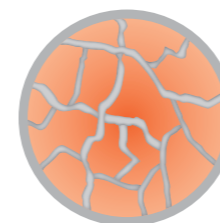
**Agarose microspheres:** Using cross-linked agarose as the matrix, they possess excellent physical and chromatographic properties, can handle large-volume samples, are easy to operate, and are resistant to conventional working conditions such as temperature, pH, and chemical reagents during the chromatography process.



**Dextran microspheres:** Microspheres formed by cross-linking and polymerizing dextran with cross-linking agents through ether bonds, featuring a uniform mesh structure. Their working principle mainly utilizes the molecular sieve effect of dextran microspheres to separate substances based on differences in their molecular sizes.

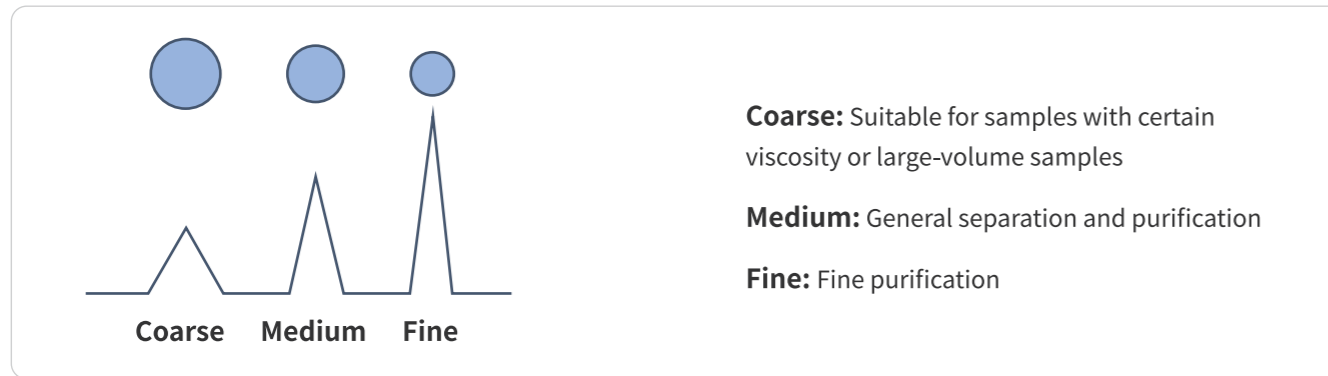


**Magnetic agarose microspheres:** Agarose is coated on the surface of magnetic cores to form superparamagnetic agarose microspheres. These microspheres eliminate the need for expensive chromatography equipment, making the binding and separation of samples with magnetic beads extremely simple and rapid. Additionally, they facilitate the realization of high-throughput and automated protein purification methods more easily.



**Polymer microspheres:** Using polymers as the matrix, which is surface hydrophilically modified and then bonded with ion exchange groups. They possess both good compatibility with large bioactive molecules and excellent physical and chemical stability, greatly improving purification efficiency. The designed pore sizes are widely used for the purification of large biological molecules such as recombinant proteins, antibodies, enzymes, polysaccharides, nucleic acids, and viruses.

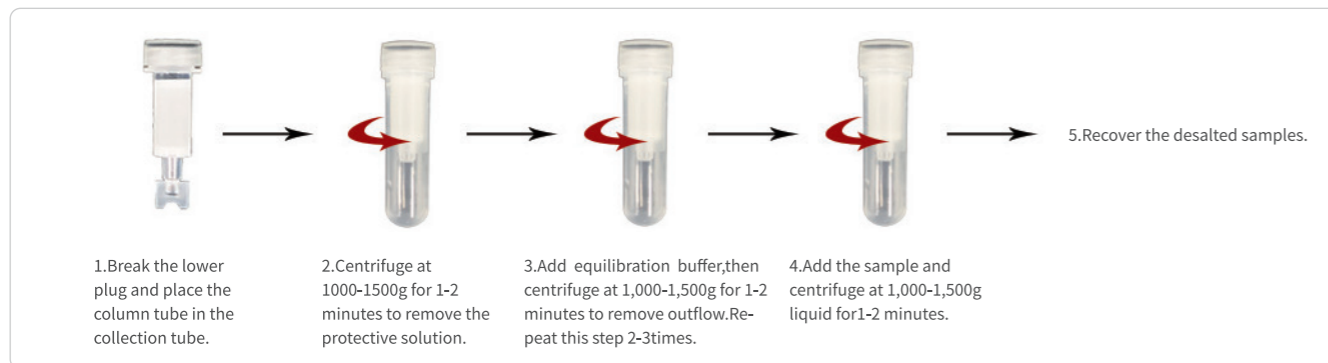
### 2.1.2 Select appropriate microsphere particle sizes according to the purification stage



### 2.1.3 Select appropriate molecular sieve products based on the separation range

*Dextran gel filtration media are mainly used for the separation and purification of polypeptides and proteins, as well as molecular weight determination, etc.*

Products	Separation Range(globulin)
Smartdex G-10	700
Smartdex G-15	1500
Smartdex G-25	1,000-5,000
Smartdex G-50	1,000-30,000
Smartdex G-75	3,000-70,000
Smartdex G-100	4,000-150,000



G25 offers desalting columns, pre-assembled columns, and gravity columns for you to choose from!

*Agarose gel filtration media are commonly used for the separation of large proteins, peptides, polysaccharides and the determination of molecular weights*

Products	Separation Range(globulin)
Smartarose 4B	70,000-20×10 <sup>6</sup>
Smartarose 6B	10,000-4×10 <sup>6</sup>
Smartarose CL- 4B	70,000-20×10 <sup>6</sup>
Smartarose CL- 6B	10,000-4×10 <sup>6</sup>
Smartarose 4FF	40,000-20×10 <sup>6</sup>
Smartarose 6FF	10,000-4×10 <sup>6</sup>



### 2.1.4 Select appropriate hydrophobic media according to hydrophobic properties

Butyl Beads 4FF

Octyl Beads 4FF

Phenyl Beads 6FF  
( Low Sub )

Phenyl Beads 6FF  
( High Sub )

Choose a suitable hydrophobic interaction medium by evaluating the relative hydrophobicity of the target protein versus contaminants:  
Under normal circumstances, the hydrophobicity follows this order: Butyl < Octyl < Phenyl, and LS-Phenyl < HS-Phenyl. All these products are available in pre-packed column formats.

### 2.1.5 Select the appropriate affinity chromatography medium based on the specificity of the ligand

#### (1) Tagged Proteins



#### Characteristics of Different Metal Ion Ligands

Metal Ion Binding Affinity:  $\text{Cu}^{2+} > \text{Ni}^{2+} > \text{Zn}^{2+} > \text{Co}^{2+}$   
Target Protein Purity:  $\text{Co}^{2+} > \text{Zn}^{2+} > \text{Ni}^{2+} > \text{Cu}^{2+}$

Pre-packed columns feature standard interfaces, compatible with various medium-pressure chromatography systems, and can be operated even under manual syringe conditions.  
**The 6FF series offers higher pressure resistance and flow rates compared to Beads.**

**IDA ligand resins** are more suitable for His-tagged proteins expressed solubly in prokaryotic systems.  
**NTA ligand resins** tolerate moderate concentrations of reducing agents, detergents, denaturants, and chelators, offering broader applicability than IDA.  
**Smart ligand resins** are compatible with higher levels of reducing agents and chelators, enabling direct purification of His-tagged proteins from eukaryotic systems without pre-treatment. Smart ligand resins are compatible with higher levels of reducing agents and chelators, enabling direct purification of His-tagged proteins from eukaryotic systems without pre-treatment.

#### Need Higher Purity?

Alternative Metal-Chelating Affinity Resins

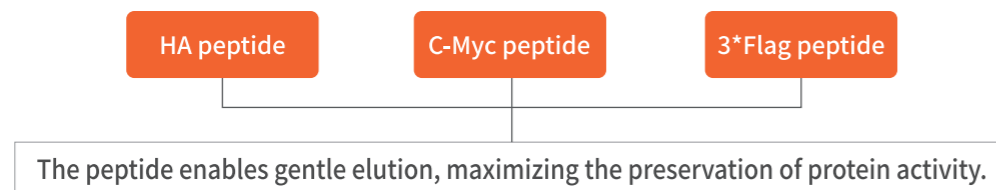
- Co NTA Beads/6FF
- Co Smart Beads 6FF

**Cobalt ions exhibit higher specificity for tagged proteins, resulting in purified samples with superior purity**



Tagged Proteins	Products
Proteins with an HA-tag	Anti-HA Affinity Beads
Proteins with a GFP-tag	Anti- GFP Affinity Beads
Proteins with a Flag-tag	Anti-DYKDDDDK Affinity Beads
	Anti-DYKDDDDK S1 Affinity Beads
Proteins with a c-Myc	Anti-c-Myc Affinity Beads

## Corresponding peptides according to different labels



Protein with MBP tag	Dextrin Beads /6FF
Protein with GST tag	Glutathione Beads/4FF
Protein with biotin tag	Streptavidin Beads 6FF
Protein with Strep-tag II	Streptavidin ST Beads 4FF, STarm Beads 4FF
Protein with Protein A tag	Rabbit IgG Beads 4FF

The 4FF and 6FF series products are available as pre-packed columns suitable for medium-pressure chromatography systems, and gravity flow columns are also offered as related products.

### (2) Antibody Products

Human IgG, dog and pig IgG, mouse IgG, rabbit IgG, etc.	rProtein A Beads/ 4FF
Human IgG & Livestock Antibodies (e.g., Bovine, Sheep, Horse)	rProtein G Beads/4FF
IP (Immunoprecipitation) & Co-IP (Co-Immunoprecipitation) for Antigen-Antibody Detection	rProtein A/G Beads 4FF
Human & Mouse Kappa Light Chain Antibody Purification	rProtein L Beads/ 4FF, Smac L
Monoclonal Antibody (mAb) Purification	Protein At Beads 4FF, Protein At Beads LX
Purification of Target Proteins via Amino Groups on Carrier Proteins	NHS-Activated Beads 4FF, NHS-Activated LA Beads 4FF
Purification of Target Proteins via Thiol Groups on Carrier Proteins	PabPur SulfoLink Beads/ 4FF

### (3) Untagged proteins

Endotoxin Removal	Endotoxin Removal Beads and kits
Glycoproteins, membrane proteins, glycolipids, polysaccharides, membrane vesicles with mannose or glucoside residues, IgM, hormones, lipoprotein purification	Con A Beads 4FF LCA Beads 4FF
Purification of albumin, interferon, enzymes requiring nucleotide assistance, 2-macroglobulin, and coagulation factors	Blue Beads 6FF
Purification of antithrombin 1, coagulation factor lipoproteins, enzymes, white synthetic nucleic acid conjugating enzymes, restriction endogenous hormones, steroid receptors, cutin, stem cell resistin, etc.	Heparin Beads 6FF
Glycoprotein purification	Boric Acid Beads 4FF
Serine protease, trypsin, protease-like enzyme purification	Benzamidine Beads 4FF

## 2.2 Purification Magnetic Beads >>>

Compared to traditional purification resins, magnetic bead-based purification products offer the advantages of lower reagent consumption, higher throughput, and no requirement for expensive instrumentation.

Pull-down,His-tag	Ni IDA Magarose Beads Ni NTA Magarose Beads Ni Smart Magarose Beads
Pull-down, GST-tag	Glutathione Magarose Beads
IP, Pull-down,Antibody purification	rProtein A Magarose Beads rProtein G Magarose Beads
IP, Pull-down,flag-tag	Anti-DYKDDDDK Magarose Beads
IP, Pull-down,GFP-tag	Anti-GFP Magarose Beads
IP, Pull-down,amino coupling	NHS-Activated Magarose Beads

### Multi-functional Magnetic Rack



The multi-functional magnetic rack features an ingenious design compatible with various centrifuge tube sizes including 1.5mL, 2.0mL, 15mL, and 50mL. With its high magnetic field strength, the rack enables rapid and efficient separation, achieving an average magnetic separation time of just 1 minute. The magnetic stand is universally compatible with all magnetic bead products and can be used for sequencing, antibody purification, immunoprecipitation, co-immunoprecipitation, cell sorting, nucleic acid isolation, and other applications.









## 2.3 Others >>>

In addition to the selection of methods and products for protein purification mentioned above, we have also developed kits for exosome and endotoxin removal for you to choose from.

Product Name	Catalog Number	Advantages	Application
Exosome Rapid Purification Kit	BK0047	Low cost and simple operation	Want to quickly concentrate and judge whether it contains exosomes or not
Exosome Affinity Purification Kit	BK0046	Low price, low equipment dependence, can quickly capture the target product in a short period of time	Captures a variety of vesicles containing cell membrane structures
Exosome Rapid Purification Kit (Column Method)	BK0056	Simple composition and reusable	Further purification and recovery of highly concentrated exosome samples
ENDOCLING® Endotoxin Removal Kit	BK0059	Magnetic bead method, convenient and quick, low equipment dependence	Endotoxin removal

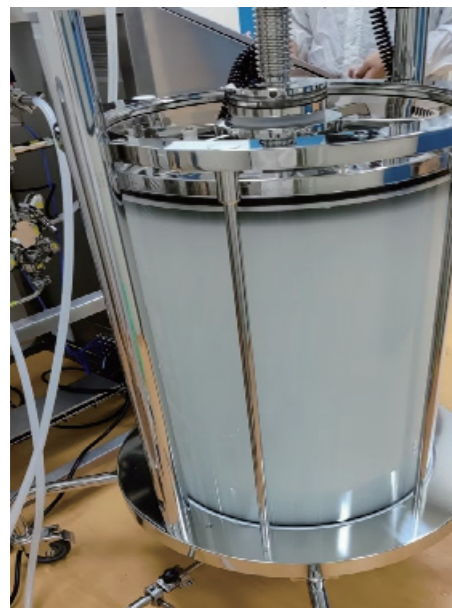
### 3. Sample Post-treatment

Purified samples prepared in different buffer systems can be transferred into a stable buffer system through dialysis, desalting, or ultrafiltration. For long-term storage, appropriate additives can be added, or samples can be stored under optimized temperature conditions. To meet desalting requirements across different volumes and equipment configurations, we offer a range of desalting column products for your selection.

Products								
	0.5ml SpinDesalt Column	3ml SpinDesalt Column	10ml SpinDesalt Column	P96 SpinDesalt Column	8.3ml Prepacked Desalting Column	1ml PreCap Desalting	5ml PreCap Desalting	20ml HiPur Desalting
Required Equipment	Centrifuge				Gravity column rack	Protein purifier		
Loading volume	100-200 µl	350 µl-750 µl	1-2.5 ml	60-180 µl	1.0-2.5 ml	100 µl	500 µl	2 ml
Time	5-10 min	10-15 min			10-20 min	10-30 min		
Volume change	Unchanged				Dilute 1.5-3 times	Dilute 1.5-2 times		
Application	Fast medesalting of small volume		Fast desalting of small volume	High throughput fast desalting of small volume	Fast desalting of middle volume	Fast desalting of small volume		Fast desalting of middle volume

If you have a large-volume sample requiring desalting, you can choose different sizes of chromatography packing based on the sample volume (we offer column packing services). The separation efficiency between proteins and small-molecule salts depends on the loading volume of the desalting column. Generally, it is recommended that the maximum sample loading volume should not exceed 30% of the column volume.

#### Application case



	Recovery rate	Resolution	16/20
Load 10%	86%	4.25	
Load 20%	87.1%	3.68	
Load 30%	85.1%	3.46	
Load 40%	89.9%	0.851	

# 03

## Protein Detection

- Electrophoresis and Western Blot
- Molecular Interactions


# Protein Detection

Conventional protein detection indicators include concentration, purity, molecular weight, isoelectric point, specificity, activity, etc. To meet the routine detection needs of a diverse user base, Boyi Bioscience has developed a series of products around "SDS-PAGE precast gels", including reagents, consumables, equipment, and kits.

## 1. Electrophoresis and Western Blot

After protein quantification, the procedures of electrophoresis, transfer, blocking, antibody incubation, and detection are performed, enabling qualitative/semi-quantitative analysis of the target protein.

### Precast gels revolutionize protein electrophoresis experiments



**Handcast gels**

**Complex Process:** It requires multiple steps such as installing the gel-making device, water-sealing the plate, pouring the gel, preparing the buffer, and inserting the comb.

**Health Hazards:** It involves various toxic reagents.

**Time-consuming:** It needs to be prepared long before the experiment.

**Poor Stability:** Significant batch-to-batch variation and short storage time.



**Precast gels**

**Convenient to Use:** Ready to use without preparing various solutions in advance and gel-pouring operations.

**Safe and Non-toxic:** No need to contact various toxic reagents.

**Time-saving:** The electrophoresis can be completed in as fast as 30 minutes.

**High Resolution:** Sharper and clearer bands.

**Good Stability:** Upgraded process, small batch-to-batch variation, and easy to store.

**High cost-effectiveness:** Outstanding price-performance ratio.

### S-TRANS semi-dry transfer system




**S-TRANS semi-dry transfer system**

**High Transfer Efficiency:** Transfer can be completed within 10 minutes, and there is no residue on the gel after transfer.

**High Compatibility:** One transfer program is compatible with all proteins below 200 kD without the need to explore conditions separately.

**Easy Operation:** Intuitive touch screen and preset programs, along with supporting transfer reagents, make the transfer simpler.

**Space-saving:** Compact body and horizontal placement.

**High Throughput:** One main machine can work with two sub-machines simultaneously, transferring six gels at a time.

### Protein staining and destaining instrument, more convenient and faster




**Protein staining and destaining instrument**

**Time-saving:** Short staining time, and the experiment can be completed within 10 minutes.

**Simple Operation:** The instrument is easy to operate with preset staining program.

**Efficient Steps:** Preset solutions can complete the experiment efficiently.

**Scientific and rational Design:** Well-designed with a scientific structure, easy maintenance, and no environmental discomfort caused by heating.

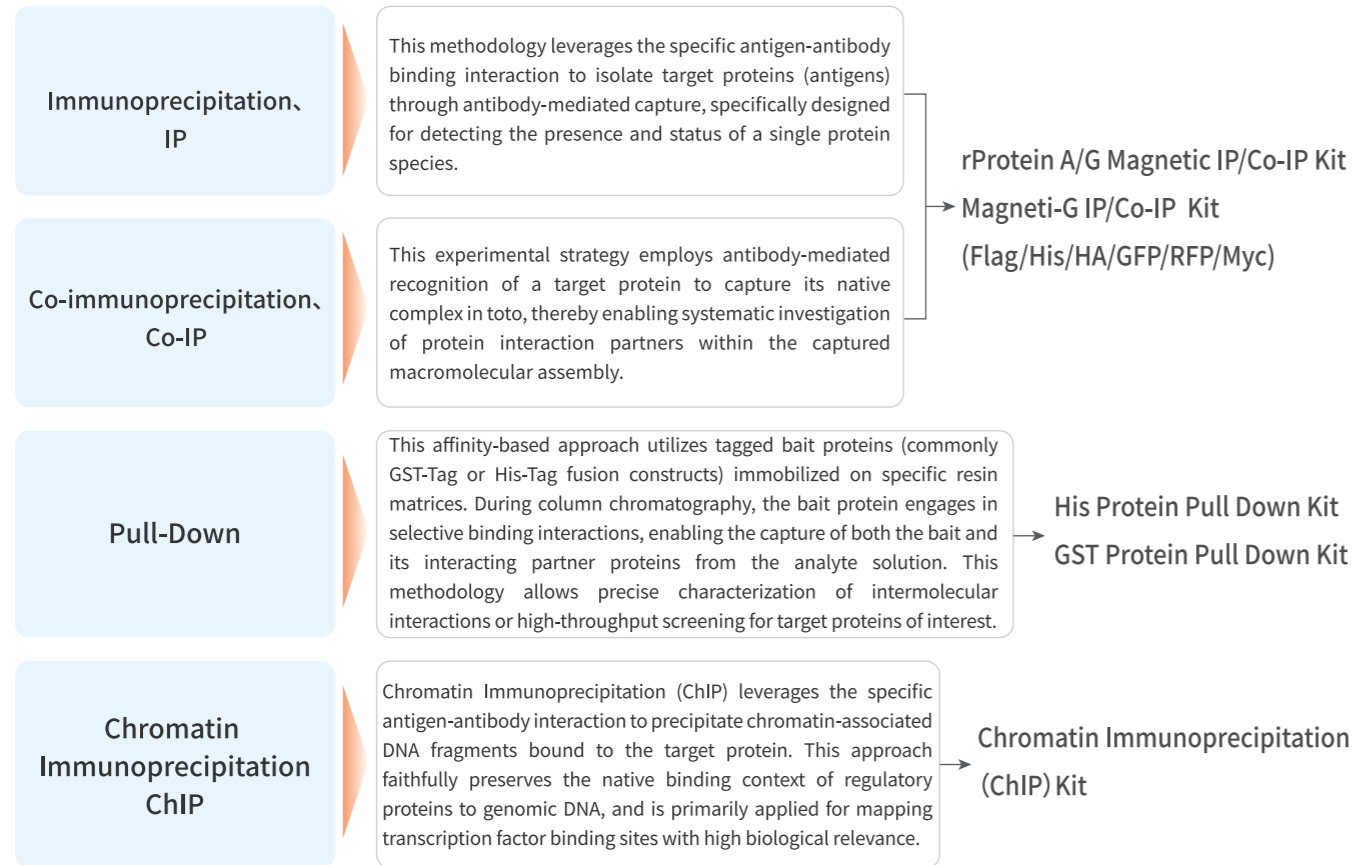
**Wide Applicability:** Applicable to most polyacrylamide gel protein staining.

## Ordering Information

Category	Product Name	Specification	Catalog Number	
Protein Quantification	BCA Protein Assay Kit	250 T	BK0001-01	
		1250 T	BK0001-02	
Protein Electrophoresis	Low-Molecular-Weight Tricine Precast Gel(16.5%,15Wells)	10 PCs/Box	TR15165Gel	
		10 PCs/Box	TR10165Gel	
		10 PCs/Box	TR12165Gel	
	SmartPAGE™ Precast Protein Gel Plus 12 Wells	4-12%, Bis-Tris	SLE014	
		4-20%, Bis-Tris	SLE015	
		8%, Bis-Tris	SLE016	
		10%, Bis-Tris	SLE017	
		12%, Bis-Tris	SLE018	
	SmartPAGE™ Precast Protein Gel Plus 15 Wells	4-12%, Bis-Tris	SLE019	
		4-20%, Bis-Tris	SLE020	
8%, Bis-Tris		SLE021		
10%, Bis-Tris		SLE022		
Protein Transfer	MOPS Running Buffer	1 L*1	SLB009	
		1 L*15	SLB0091	
	Protein Gel Staining & Destaining Kit	5L+2L	BK0043-01	
	Protein Gel Staining & Destaining System	台	FW613	
	Polyacrylamide Protein Gel Rapid Staining Solution	500ml	BR0070-01	
		1L	BR0070-02	
	Protein Transfer	Fast Transfer Buffer (20X)	500 mL	BR0003-01
		Fast Transfer Buffer (Powder)	10 PKs/Box	BR0011-01
		S-TRANS Rapid Western Blot Transfer Kit	125 T	BK0003-01
			125 T*4	BK0003-02
S-TRANS Anode Buffer		1 L	BR0007-01	
S-TRANS Cathode Buffer		1 L	BR0008-01	
S-S-TRANS High-Efficiency Transfer Pad		400 PCs	BR0009-01	
Mini Vertical Electrophoresis (Core Assembly Kit)		SET	FW612	
Fast Wet Transfer Gel Tank		1 unit	FW601	
S-TRANS Rapid Multi-Channel Semi-Dry Transfer System (Main Unit)		SET	FW606	
S-TRANS Rapid Multi-Channel Semi-Dry Transfer System (Satellite Unit I)	SET	FW607		
S-TRANS Rapid Multi-Channel Semi-Dry Transfer System (Satellite Unit II)	SET	FW608		
Blocking & Incubation	Rapid Protein-Free Blocking Buffer	500ml	BR0051-01	
	Anti-DYKDDDDK Antibody	100 μL(1 mg/mL)	BP0002-01	
	Anti-HA Antibody	100 μL(1 mg/mL)	BP0004-01	
	Anti-c-Myc Antibody	100 μL(1 mg/mL)	BP0001-01	
	Anti-GFP Antibody	100 μL(1 mg/mL)	BP0003-01	
	Anti-His Antibody	100 μL(1 mg/mL)	BP0005-01	
	Anti DYKDDDDK Antibody-HRP	20μl	BP5013-01	
		100μl	BP5013-02	
		1ml	BP5013-03	
	Anti Myc Antibody-HRP	20μl	BP5012-01	
		100μl	BP5012-02	
		1ml	BP5012-03	
	Anti HA Antibody-HRP	20μl	BP5015-01	
		100μl	BP5015-02	
		1ml	BP5015-03	
Anti His Antibody-HRP	20μl	BP5016-01		
	100μl	BP5016-02		
	1ml	BP5016-03		
Universal Antibody Diluent	100ml	BR0122-01		
PBST(10×)	500ml	BR0121-01		
Detection	ECL Basic	50 mL+50 mL	BK0040-01	
		250 mL+250 mL	BK0040-02	
	ECL Enhanced	50 mL+50 mL	BK0041-01	
		250 mL+250 mL	BK0041-02	
ECL Super	50 mL+50 mL	BK0042-01		

## 2. Molecular Interactions

Molecular interactions refer to the dynamic associations between distinct biomolecules (e.g., proteins, nucleic acids) occurring either in vivo or in vitro. Core methodologies include Immunoprecipitation (IP), Co-Immunoprecipitation (Co-IP), Pull-Down assays, and Chromatin Immunoprecipitation (ChIP), among others.



### Ordering Information

Product Name	Specification	Catalog Number
rProtein A/G Magnetic IP/Co-IP Kit	10 T	BK0004-01
	50 T	BK0004-02
Magneti-G Myc-tag IP/Co-IP Kit	10T	BK0050-01
	50T	BK0050-02
Magneti-G DYKDDDDK-tag IP/Co-IP Kit	10T	BK0048-01
	50T	BK0048-02
Magneti-G His-tag IP/Co-IP Kit	10T	BK0049-01
	50T	BK0049-02
Magneti-G HA-tag IP/Co-IP Kit	10T	BK0051-01
	50T	BK0051-02
Magneti-G GFP-tag IP/Co-IP Kit	10T	BK0052-01
	50T	BK0052-02
Magneti-G RFP-tag IP/Co-IP Kit	10T	BK0053-01
	50T	BK0053-02
His Protein Pull Down Kit	5T	BK0055-t
	25T	BK0055-01
GST Protein Pull Down Kit	5T	BK0054-t
	25T	BK0054-01
Chromatin Immunoprecipitation (ChIP)Kit	24 T	BK0045-01
MagET™ IP/Co-IP Kit	8T	BK0044-t
	48T	BK0044-01
Multi-functional Magnetic Rack	14 wells	BR0057-01
16 Wells Magnetic Rack	16 wells	BR0025-01

# 04

## Protein Application

- Immunoassay
- Cell Sorting

# Protein Application

In addition to the protein detection described in Chapter 3, we will also select different technology platforms to evaluate the performance of proteins according to their downstream application scenarios. This chapter focuses primarily on the application of proteins in in vitro diagnostics and cell sorting, in which in vitro diagnostics can be subdivided into biochemical diagnostics, immuno-diagnostics, hematology, molecular diagnostics, and POCT.

## 1. Immunoassay

Currently, the most widely used immunoassay methods include chemiluminescence, latex immunoturbidimetry, and immunochromatography. Boyi provides a diverse range of key raw materials such as magnetic microspheres, latex microspheres, and time-resolved microspheres, which can meet major application and testing requirements in these fields.

Uniform size and monodispersity

A diverse range of surface-modified microspheres with functional groups covering major mainstream types



**Advantages**

ISO 13485 Quality System Certified, stable and controllable quality with high cost-effectiveness

Customized microsphere services (particle size, functional groups, magnetic content, etc.) and immunodiagnostic reagent development services are available

### 1.1 Chemiluminescence-Based Detection Results >>>

The Anti-CA153-093 monoclonal antibody (Catalog No.: BP0011), independently developed by Boyi, was conjugated to Carboxyl-Activated MagPoly Beads (Catalog No.: MP1201) using a two-step conjugation method. Key performances including Response curve, Precision, and Clinical Correlation, were evaluated on an acridinium ester-based direct chemiluminescence system (Detection instrument: Fully automated chemiluminescence analyzer; Brand: Yingkai; Model: I2910).

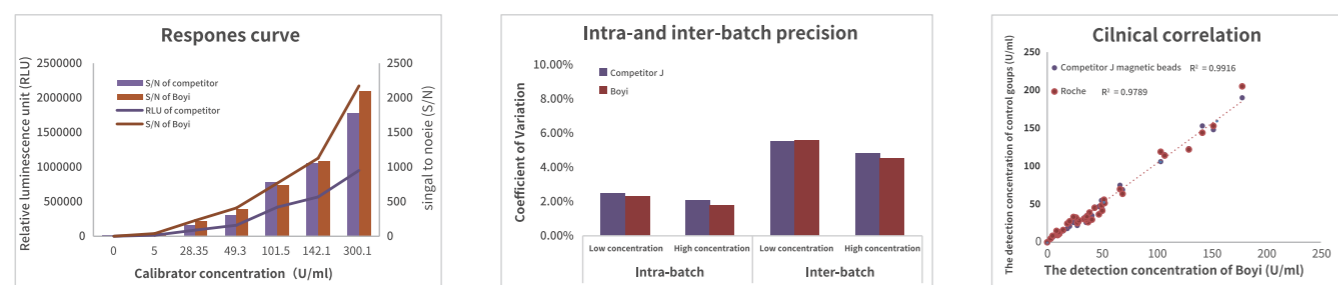


Figure 4.1 Research on the performance of Carboxyl-Activated MagPoly Beads (Take the CA153 project as an example).

### 1.2 Latex immunoturbidimetry-Based Detection Results >>>

Different kinds of antibodies were selected and immobilized onto self-developed latex microspheres with varying particle sizes through a series of processes, including activation, conjugation, and blocking. The reactivity test was then performed on a fully automated biochemical analyzer (Brand: Hitachi, Model: 7180)

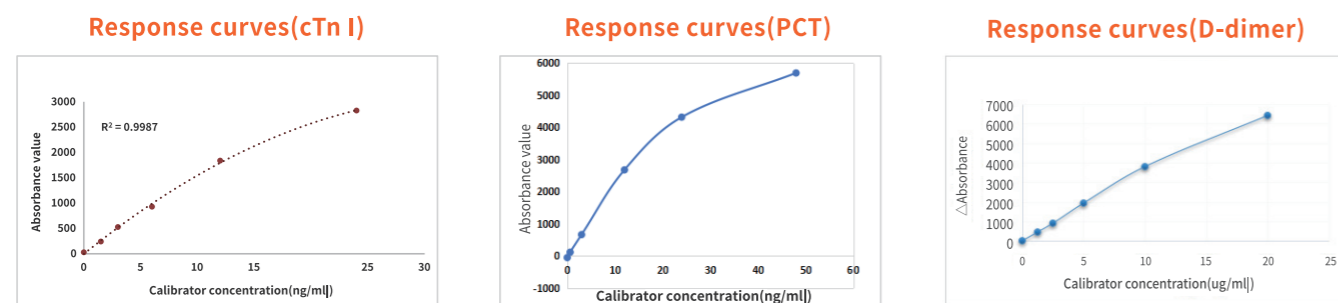


Figure 4.2 Detection range: 0.5-25.0ng/ml.

Figure 4.3 Detection range: 0.2-25.0ng/ml.

Figure 4.4 Detection range: 0.2-20.0ug/ml.

### 1.3 Immunochromatography-Based Detection Results >>>

Depending on specific application-requirements, carriers such as colloidal gold, time-resolved microspheres, or fluorescent microspheres can be selected for the conjugation and modification of proteins or antibodies, enabling qualitative or semi-quantitative evaluation of their performance.



blank 0.3μg/ml 1.6μg/ml 2.5μg/ml 5μg/ml 8μg/ml 10μg/ml 20μg/ml 40μg/ml 40μg/ml 200μg/ml 1mg/ml

#### Ordering Information

Product Name	Catalog Number	Diameter(nm)	Solids content	
Carboxyl-Activated MagPoly Beads	MP1201	1000	10 mg/ml	
	MP1202	2800		
Amino-Activated Magpoly Beads	MP0201	1000		
Streptavidin Magpoly Beads	MP0601	1000		
	MP0602	2800		
NHS-Activated MagPoly Beads	MP0701	1000		
Epoxy-Activated MagPoly Beads	MP1101	1000		
Tosyl-Activated MagPoly Beads	MP0503	2800		
Carboxyl Polystyrene Latex	BL101120	120		10%
	BL101150	150		
	BL101200	200		
	BL101250	250		
	BL101300	300		
Time-resolved Fluorescence Microsphere	BL105200	200	1%	
	BL105300	300		
Green Fluorescence Microsphere	BL107200	200	1%	
	BL107300	300		
	BL107400	400		
Nano Colloidal Gold	GN0101	20-50	0.04%	
Colloidal Gold Polymer	GP0101	200	10mg/ml	
	GP0201	300		
Colloidal Gold Magpoly Beads	GM0101	200	10mg/ml	
	GM0201	300		
	GM0301	500		

\*Customization Service: We offer customization of magnetic microspheres ranging from 200nm to 2800nm to meet the specific requirements of our customers.

## 2. Cell Sorting

Cell sorting technology includes Fluorescence-Activated Cell Sorting (FACS), Magnetic-Activated Cell Separation (MACS), and Microelectromechanical Systems (MEMS). Among these, MACS can be further divided into positive sorting and negative sorting. In positive sorting, the target cells remain in the magnetic field, while in negative sorting, the target cells are found in the supernatant. The advantages of MACS compared to other methods include:

- ▶ High purity and viability of sorted cells.
- ▶ Quick and simple operation process.
- ▶ Capability for automation and high throughput without the need for large instruments.

For MACS, Boyi supplies proprietary magnetic beads and columns, alongside custom conjugation services to produce application-specific sorting beads. For FACS, fluorescent labeling and analytical validation (specificity/sensitivity) are available.

Flexible Selection Options: Nanoscale and micron-scale magnetic beads are available, compatible with a comprehensive range of consumables

### Advantages

Unique Fluorescent Antibody Labeling Technology: Exceptional specificity and high sensitivity

Customized Solutions to meet diverse application needs

### Application case

Self-developed Anti-Human CD34 mAbs were conjugated to Amino-Activated Dextran-coated MagNano Beads to prepare Human CD34 CellSorting Beads. Via columns, the purity of K562-CD34/K562 was significantly improved, demonstrating high affinity and specificity.

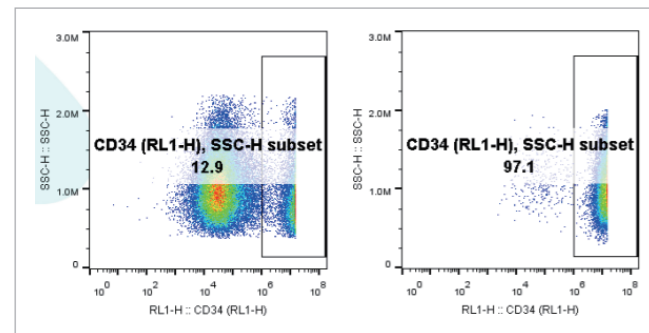


Figure 4.5. The purity of CD34+ cells increased from 12.9% to 97.1% after sorting the K562-CD34/K562 mixed cell population.

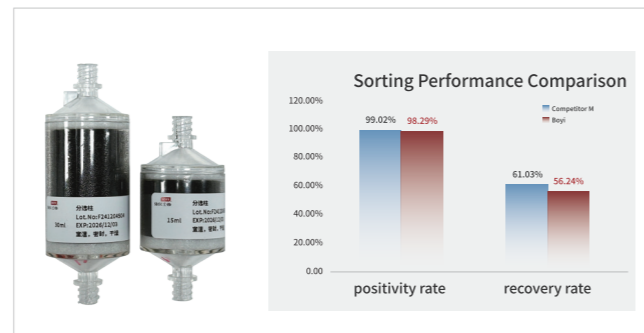


Figure 4.6. Boyi's Column (left): positivity rate and recovery rate are comparable to Competitor M (right).

### Ordering Information

Product Name	Catalog Number	Characteristic and Application
Dextran-coated MagNano Beads	MP1401	Nanoscale (50nm)
Amino-Activated Dextran-coated MagNano Beads	MP1601	
Streptavidin Dextran-coated MagNano Beads	MP1701	
Human CD34 CellSorting Beadsz	MP1801	Adapted to cell sorters
Column	BR5001	
Anti-CD3 mAb	BP0062	
Anti-Human CD4 mAb	BP0063	
Anti-Human CD8a mAb	BP0064	
Anti-Human CD14 mAb		
Anti-Human CD16a mAb	BP0134	
Anti-Human CD19 mAb	BP0066	
Anti-Human CD25 mAb	BP0068	
Anti-Human CD28 mAb	BP0069	
Anti-Human CD56 mAb	BP0126	We can provide fluorescent labeling services such as PE, APC, FITC, Percp-Cy5.5 and APC-Cy7
Anti-Human CD34 mAb	BP0127	
Anti-Human CD36 mAb		
Anti-Human CD45 mAb	BP0128	
Anti-Human CD66b mAb		
Anti-Human CD138 mAb	BP0163	

# 05

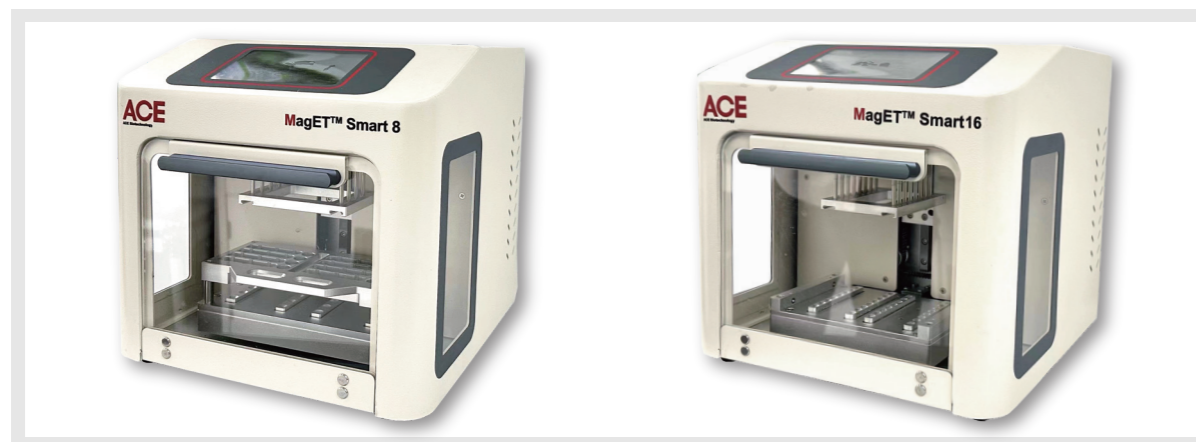
## Equipment And Consumables

- Automated magnetic Separation And Extraction Equipment
- Protein Purification
- Other Small Equipments

# Equipment And Consumables

## 1. Automated Magnetic Separation And Extraction Equipment

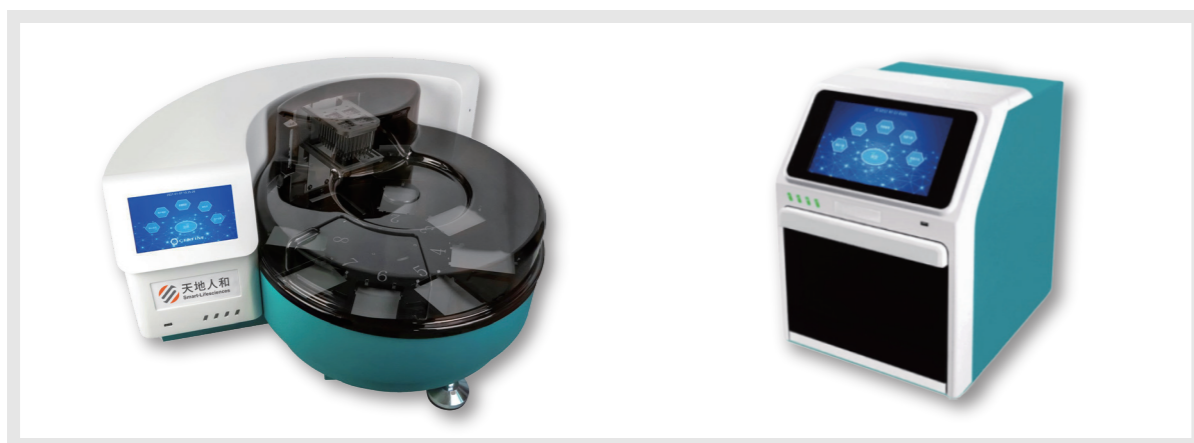
The Meg ETTM Smart series adopts magnetic bead separation technology. Magnetic beads are moved between 6-tube tubes containing specific reagents and centrifuge tubes or deep well plates. Disposable magnetic rod sleeves are loaded on the magnetic rods. Through the separation of the magnetic rods and the magnetic rod sleeves, the activation, bonding, cleaning and release of the magnetic beads are achieved. It can extract high-quality nucleic acids from saliva, swabs, dried blood spots, whole blood, serum/plasma, and animal and plant tissue samples, and also purify proteins from the samples.



### Ordering Information

Category	Product Name	Catalog Number	Specification
Instruments	MagET Smart 8 Extractor	FW610	1Pc
	MagET Smart 16 Extractor	FW611	1Pc
Consumables	MagET 8-channel Magnetic Adapter	BR0019-01	120/Pcs
	MagET 96-Well Deep-Well Plate	BR0020-01	10/Pcs

This series of fully automated purifiers, based on magnetic bead separation technology, is designed for high-throughput purification and is available in 24-, 32-, and 96-channel formats. With dedicated programs, the system can process up to 192 samples simultaneously.



### Ordering Information

Product Name	Catalog Number	Specification
P24	P241001	1Pc
P32	P321001	1Pc
P96	P961001	1Pc
24 tip comb and 24 deep well plate	SLM-P24-2	40/Pcs
24 deep well plate	SLM-P24-1	50/Pcs
Purifier 24 Magnetic rods	P961282AB	1Pc
32 tip comb	SLM-P32-2	600/Pcs
UV lamp	P10022	1Pc
96 tip comb	SLM-P96-2	100/Pcs
96 deep well plate	SLM-P96-1	50/Pcs
Purifier 96 Magnetic rods	P961281AB	1Pc

## 2. Protein Purification

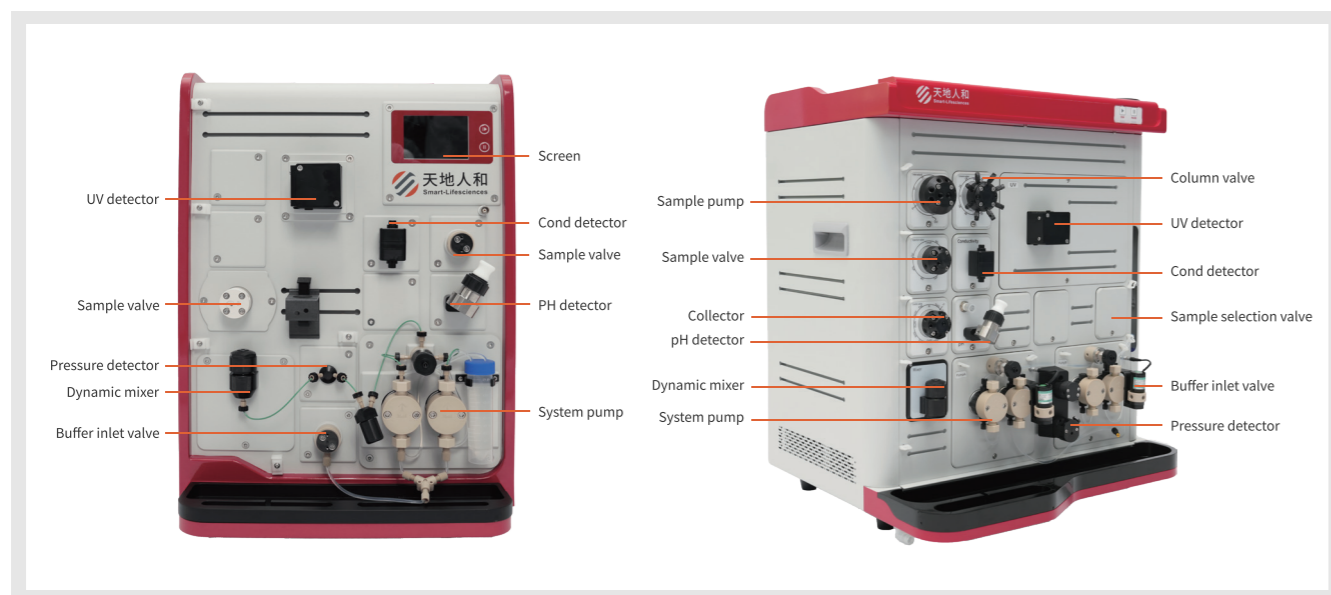


10-Channel Automatic Purification Instrument is suitable for laboratory and industrial-scale process exploration and preparation, ranging from analytical and small-scale preparation to pilot-scale production. It can separate, purify and prepare biological macromolecules such as proteins, antibodies, peptides, polysaccharides and nucleic acids, as well as active components of Chinese herbal medicines and natural products through chromatographic spectroscopy techniques such as gel filtration, ion exchange, affinity chromatography and hydrophobic chromatography.

### Ordering Information

Category	Product Name	Catalog Number
Apparatus	10-Channel Automatic Purification Instrument	E011
Consumable	50ml tube rack	E011-01
	15ml tube rack	E011-02
	Silicone hose	E011-03
	Transparent hose	E011-04
	3ml tube plug	SLM030
	12ml tube plug	SLM031
	Connector Ruhr male	SLM032

The Smart GO™ Protein Chromatography System is a compact liquid chromatography system designed for laboratory-scale process research and method development. It supports protein, antibody, vaccine, peptide, virus, and other large-molecule purification from the microgram to gram scale. The Smart PUR™ Protein Chromatography System offers powerful, precise, and stable performance, making it ideal for purification process development of recombinant proteins, antibodies, vaccines, nucleic acids, and diagnostic raw materials, ranging from micrograms to tens of grams. The powerful Vaticy control software boasts comprehensive functionalities, meticulously designed to align with users' habitual operation patterns. It has integrated parameter information of various pre-packed columns from Smart-Lifesciences. This software effectively guides customers in the development of purification methods and the design of experiments. The built-in method exploration feature serves as an ideal companion for process development, enabling users to optimize their workflows with ease.



### Ordering Information

Category	Product Name	Catalog Number	Specification
Chromatography System	Smart GO 150	E015	1Pc
	Smart GO 100	E016	1Pc
	Smart GO 35	E017	1Pc
	Smart PUR 150	E012	1Pc
	Smart PUR 100	E013	1Pc
	Smart PUR 35	E014	1Pc

Note: Other accessories and consumables can be configured according to your requirements. Please feel free to consult us separately.

## 3. Other Related Equipments Ordering Information

No.	Product Name	Catalog Number	Product Images	Characteristic	Parameters
1	Dry Bath/Block Heater	FW614		Digital controls and display of time and temperature; Application for sample preparation, Enzyme preservation, Enzyme-substrate reactions and DNA amplification.	Temperature range: 25-120°C
2	Mini Block Heater	FW615		Designed for programmable heating/cooling bath with digital display, equipped with a hot cover to prevent solution Evaporation.	Temperature range: 0-100°C
3	Basic Magnetic Stirrer	FW616		Rely on safety and consistent stirring speed with the Basic Magnetic stirrer. Benefit from exceptionally strong magnet coupling power and a smooth-start stirring mechanism.	Stirring capacity:1.5L
4	LCD Digital controls Magnetic Stirrer	FW617		Get precise stirring control for your routine protocols, providing flexibility from micro-scale chemistries to production operation.	Stirring capacity:5L
5	Vortex Mixer	FW621		Designed for kneading, mixing, blending, and other applications requiring the physical processing of various samples or materials.	Speed range:0-3000rpm
6	Disk Mixer	FW622		Designed for accurate speed control for continuous mixing or pulsing of samples.	Speed range:0-80rpm
7	Micro Centrifuge	FW619		Tool-free rotors and quick-spin options make it fast and easy to use. Ideal for microfilter cell separations and other samples, with adapters to accommodate all major microtube and PCR tube styles (2.0, 1.5, 0.5, 0.2ml).	Max speed:7000rpm
8	Low speed Centrifuge	FW620		Ergonomic design fits on any workstation and is comfortable and easy for anyone to operate. Ideal for most protocols requiring low spins and appropriate for cell separation.	Max speed:4500rpm
9	Homogenizer	FW618		The Homogenizer delivers quiet, efficient blending from enrichment media in Homogenizer or other formats.	10 levels adjustable, Volume Range: 1.1-250ml, 5000Pas
10	Circle Platform Rocker	FW623		Provide gentle motion for mixing samples. Designed for hybridization, blotting and staining or destaining gels.	Dimensions (L x W): 25x24cm Speed Range: 100-800rm
11	Pipette racks	FW624		Serve the critical function of securely storing and organizing pipettes, safeguarding them from potential damage and contamination.	6 Pipettes
12	Multi functional Magnetic Rack	BR0057-01		It is used to perform gentle tube-based isolation and purification of small molecules. The DynaMag magnetic bead separators are designed for different applications and needs.	Optimal working tube: 1.5, 2, 15, 50ml centrifuge tube
13	16-tube Magnetic Rack	BR0025-01			Holds up to 16 standard 1.5-2 mL microcentrifuge tubes in numbered spaces

# 06

## One-stop Solution

- Protein Expression
- Protein Purification
- Protein Application

## One-Stop Solution

As a professional manufacturer of biological microspheres, Boyi has established a series of mature technology platforms centered around "biological microspheres" and developed a wide variety of microsphere products and derivative products, which basically cover the protein research needs. In addition, Boyi focuses on customer needs and provides a "one-stop solution service" for protein research based on mature technology platforms, diversified products, and professional technical services.



Provide one-stop solution services for protein research (ISO: 13485, ISO: 9001)

<b>Protein Expression</b>	· Antibody development · plasmid extraction · antibody expression · stable strain construction · personalized protein preparation
<b>Protein Purification</b>	· Development of protein purification process · ligand coupling · microsphere preparation and column loading service
<b>Protein Applications</b>	· protein labeling · development of diagnostic reagents, etc.

### Advantages

#### ► One-Stop Solution

Provide full process services from antigen and antibody preparation to delivery of diagnostic reagent products

#### ► Rich Experience

· More than ten years of experience in the field of biological microspheres · Professional R&D team

#### ► Professional Services

· Independent research and production, stable quality, controllable cost  
· Diversified development platforms for key raw materials and diagnostic reagents

#### ► Ownership and Intellectual Property Protection

· Information sharing · Full ownership and intellectual property rights over all services

## 1. Protein Expression

### 1.1 Antibody Development Service >>>

Boyi can provide the antibody discovery services, which include the mouse monoclonal antibody with hybridoma method, antibody sequencing and production platforms. Based on our platform strengths and client requirements, we provide tailored proposals to help clients achieve their research goals, we also provide the one to one professional and customized service, which includes the final product, detection reports, IP, etc.

### 1.1.1 Rabbit Polyclonal Antibody Discovery

Rabbit polyclonal antibody preparation is a technology that immunizes the host to produce antibodies with multi-epitopes. This technology takes full advantage of the features of the immune system to stimulate the host animal with specific antigen, and then induce immune cells to produce a large amount of antibodies.

#### Advantages

- ▶ **High Yield:** Suitable for large-scale antibody production
- ▶ **High Titer:** The immune response is usually strong, and high titer antibodies could be obtained
- ▶ **High Affinity:** Tightly binding to antigen to improve the accuracy of detection
- ▶ **Ease to Preparation:** Rabbits are easy to handle and management, the immune system responds quickly
- ▶ **Multi-epitope Recognition:** recognition of multiple epitopes, suitable for a variety of detection methods (ELISA, WB, IHC, etc.)

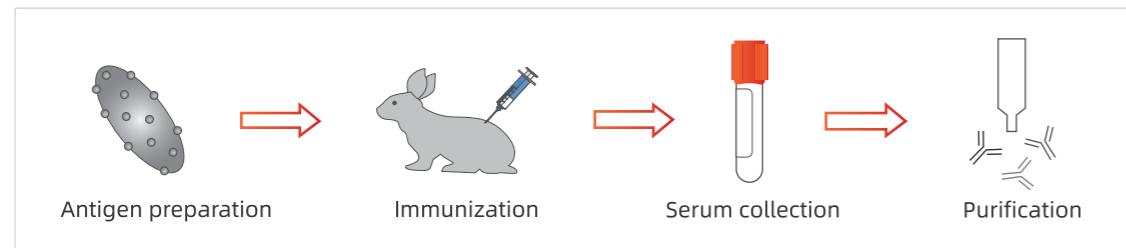


Figure 6.1. Rabbit pAb discovery procession.

### 1.1.2 Mouse Monoclonal Antibody Discovery

After mouse immunization, B lymphocytes cells fusion with bone marrow cells to form hybridoma cells which could be cultured in vitro and secrete antibodies. After screening and cloning, the stable hybridoma cell line will be obtained (see Figure 6.2). At the same time, the variable region sequences of the heavy chain and light chain are amplified by specific PCR primers for different antibody species. Finally, recombinant antibodies are then produced in vitro through expression and purification.

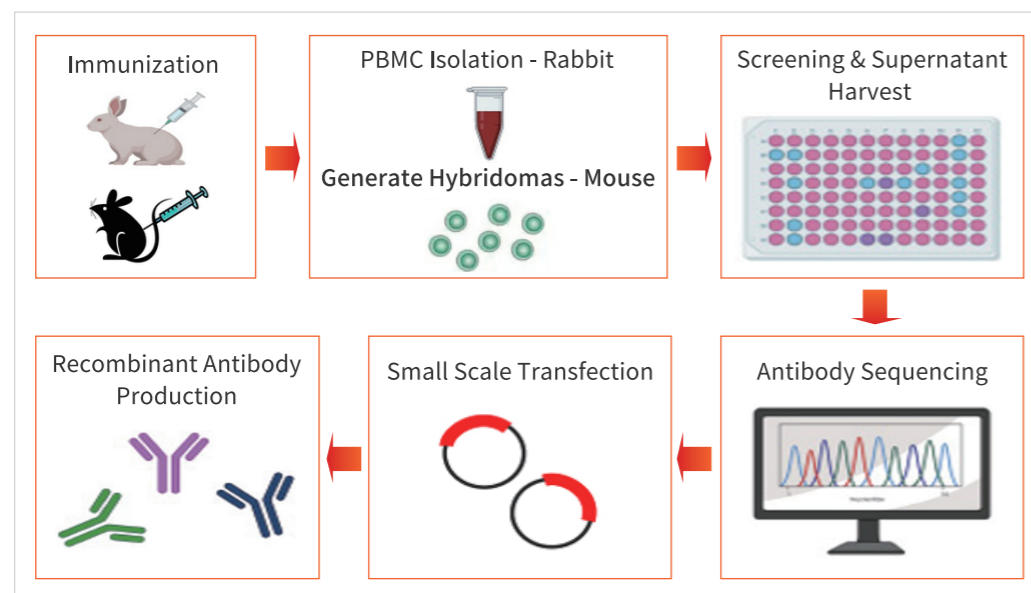


Figure 6.2. Mouse mAb discovery procession.

### 1.1.3 Antibody Sequencing Service

The fastest way to obtain protein sequence is to directly analyze the original protein, obtain the primary structure and quickly realize the accurate analysis of the amino acid sequence from the relevant protein. Therefore, mass spectrometry method has become the first choice for antibody sequencing. In most mass spectrometry antibody sequencing procedure, the antibody is first broken down into 15-20 amino acid-long peptides, which are then analyzed in a mass spectrometer (Figure 6.3).

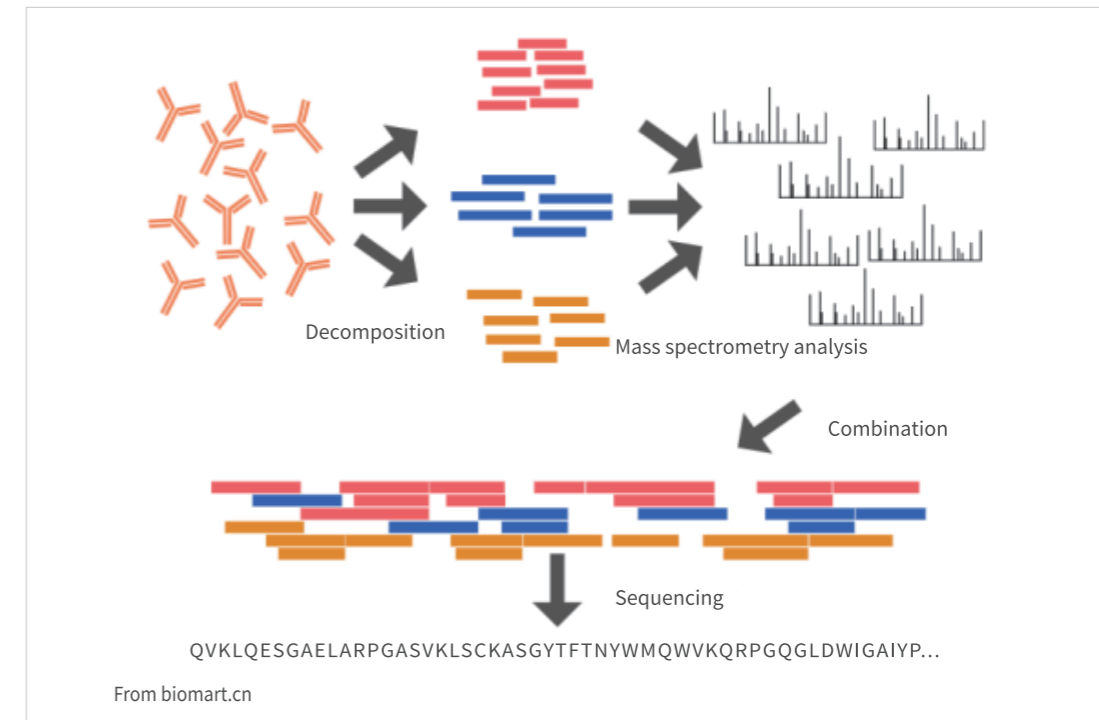


Figure 6.3 Antibody protein sequencing process.

## 1.2 Plasmid Extraction Services >>>

Eukaryotic expression, CAR-T, AAV, lentiviral packaging, and related experiments require large-scale production of high-quality plasmids. To meet this demand, Boyi has developed a specialized plasmid extraction kit tailored to these applications. We could extract 100 mg grade plasmids within 5-10 working days and ensure that the endotoxin is less than 1 EU/mg, the concentration is greater than 1 mg/mL and the superhelix is > 95%. (Figure 6.4 for the plasmid extraction data).

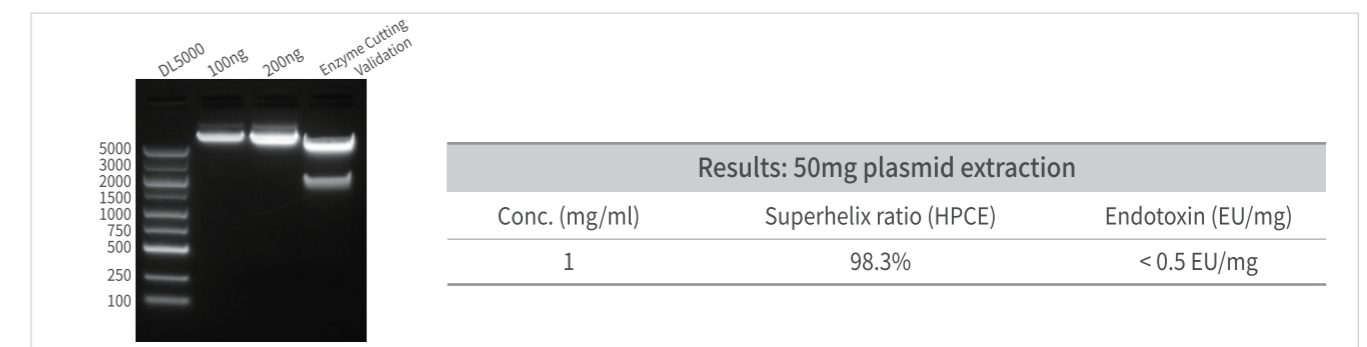


Figure 6.4 The plasmid extraction data showed that the superhelix was high and the endotoxin content was low.

## 1.3 Antibody Production Service >>>

Boyi provides recombinant antibody expression services, including both monoclonal and bispecific antibodies. We will produce antibodies according to client's requirements, with guaranteed expression levels and quality standards to ensure reliable delivery. (Figure 6.5 for the purification data of antibody production).

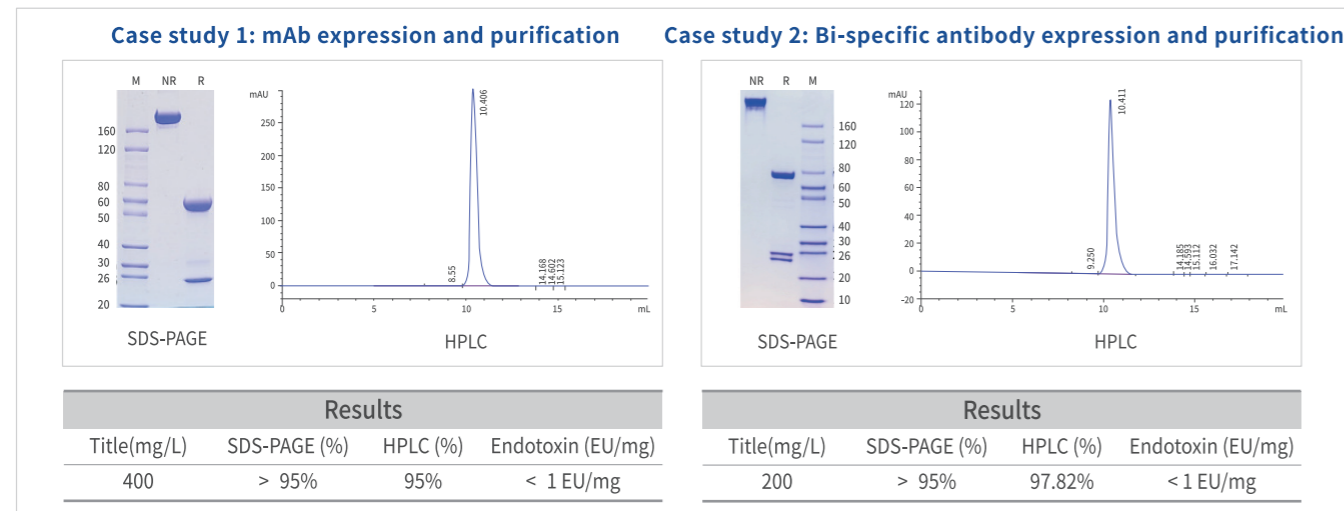


Figure 6.5 Antibody expression and purification data.

## 1.4 Customized Service >>>

Boyi conducts both intracellular and extracellular protein expression and purification by our self-developed expression and dual-label purification system. Target proteins are qualitatively and quantitatively determined by the corresponding labeled antibodies. (Figure 6.6 for the expression and purification data of customized proteins).

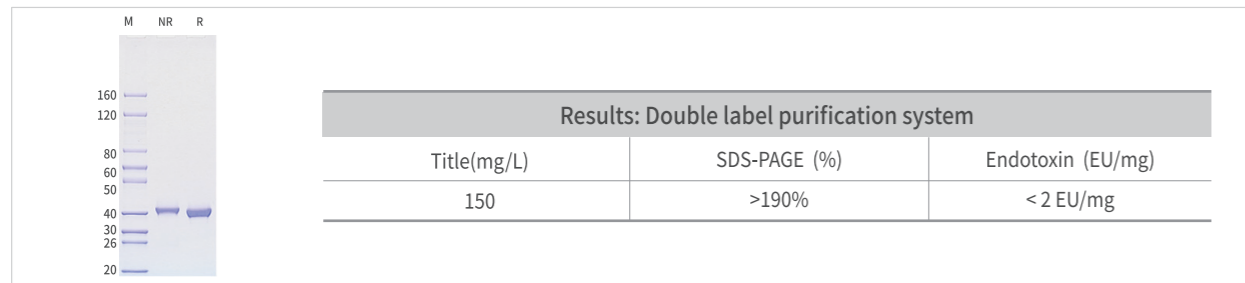


Figure 6.6 Antigen customized expression and purification data.

## 1.5 Stable Cell Line Construction Service >>>

Boyi also offers stable cell line construction services. This involves cloning foreign DNA into a vector, transfecting it into host cells, integrating it into the host genome, and screening it by resistance markers contained in the vector. The most commonly used markers for resistance screening were neomycin, hygromycin and puromycin. Finally, the stable cell lines can consistently and efficiently express the target protein (Figure 6.7).

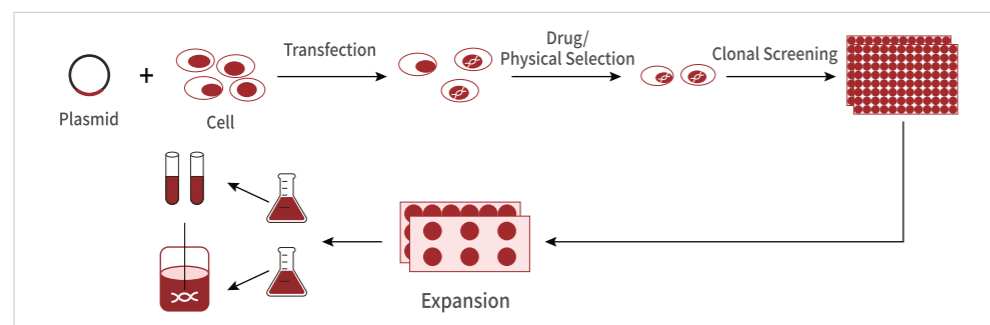


Figure 6.7 Flow chart of stable cell line construction

## 2. Protein Purification

### 2.1 Purification Process Development Services >>>

Smart-lifesciences provides purification process development services for enterprise customers. To help customers establish a complete process route, we conduct a series of experiments involving screening, combination, and condition optimization based on the information provided by customers. From sample pretreatment to protein purification, including related appraisal methods and post-processing technology, Smart-lifesciences assists in creating a comprehensive purification process. Additionally, we provide scalable solutions with appropriate amplification processes, offering a one-stop solution for all your purification needs.

#### Serving Procedure



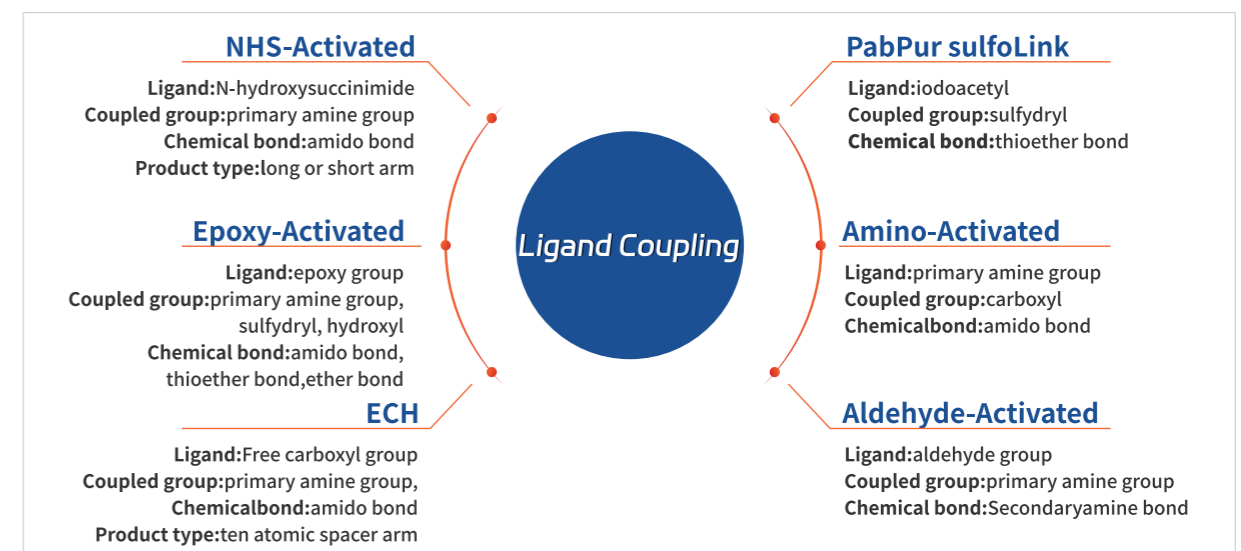
### 2.2 Ligand Coupling Service >>>

Ligand coupling involves attaching purified antigens, antibodies, and other proteins to pre-activated chemical groups on a medium's surface through amino acids on the protein surface. This process immobilizes the proteins on the medium's surface, enabling the purification of corresponding antibodies or antigens, immunoprecipitation (IP/Co-IP), or the immobilization of active enzymes.

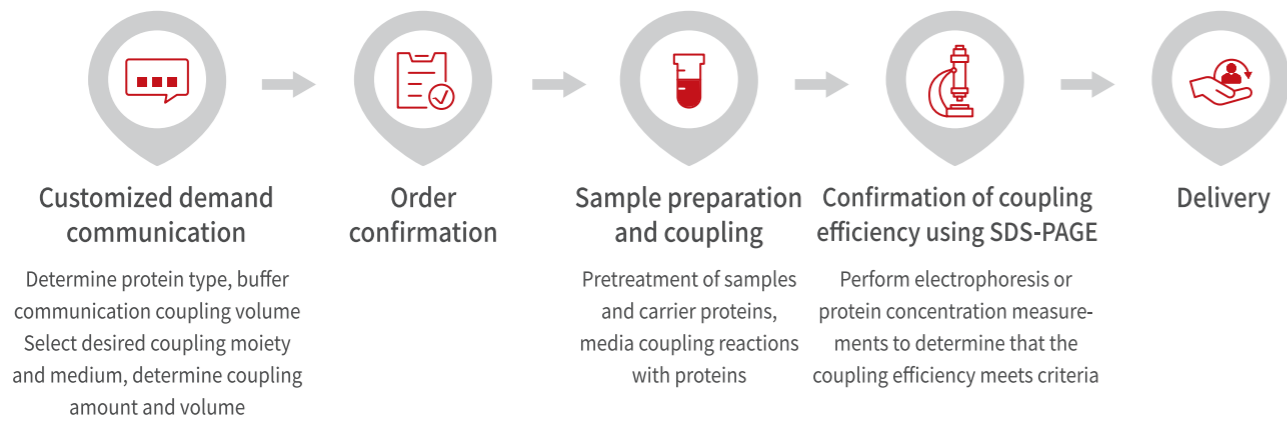
#### Service Advantages

- ▶ **Diverse Media Options:** A variety of pre-activated media are available for selection
- ▶ **Multiple Protein Groups for Coupling:** Amino, sulfhydryl, hydroxyl, carboxyl, and other groups on the protein surface can be chosen for coupling
- ▶ **High Coupling Efficiency:** Up to 10 mg of antibodies can be coupled per milliliter of media, and efficiency > 90%

#### Service Content



### Serving Procedure



## 2.3 Microsphere Custom Service >>>

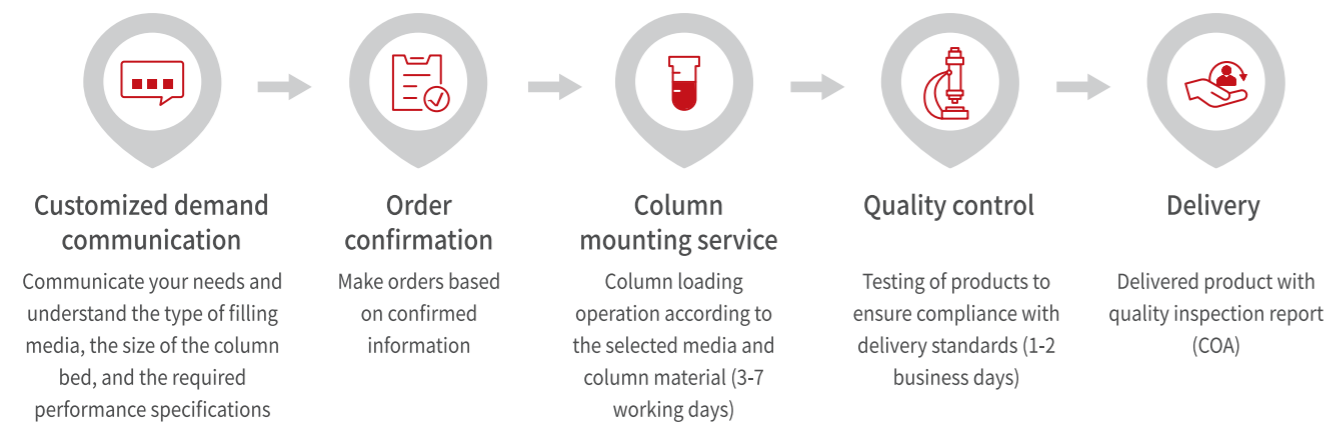
To support diverse purification needs during product development, we offer customized microsphere services. You can select specifications such as microsphere type, particle size, material, pressure tolerance, and flow velocity. Detailed parameters are provided in the following table.

Customization Type	Customize Content
Customize Content	Affinity, Ion Exchange, Hydrophobic
Partical Size	34μm, 40μm, 90μm, Big Beads (100-200μm)
Microsphere Material	Dextrin, Agarose, polymer
Pressure	0.1MPa, 0.3MPa
Flow Velocity	100cm/h, 300cm/h, 500cm/h, 700cm/h

## 2.4 Column Mounting Service >>>

Chromatographic column loading service involves loading affinity, ion-exchange, hydrophobic, molecular sieve and multi-mode chromatographic media into the designated model of chromatographic column and achieving the specified number of plates and symmetry coefficient. The packed chromatography column can be directly connected to the protein purification instrument for protein separation and purification, which helps accelerate the R&D process and reduce the workload of daily experimental preparation.

### Serving Procedure

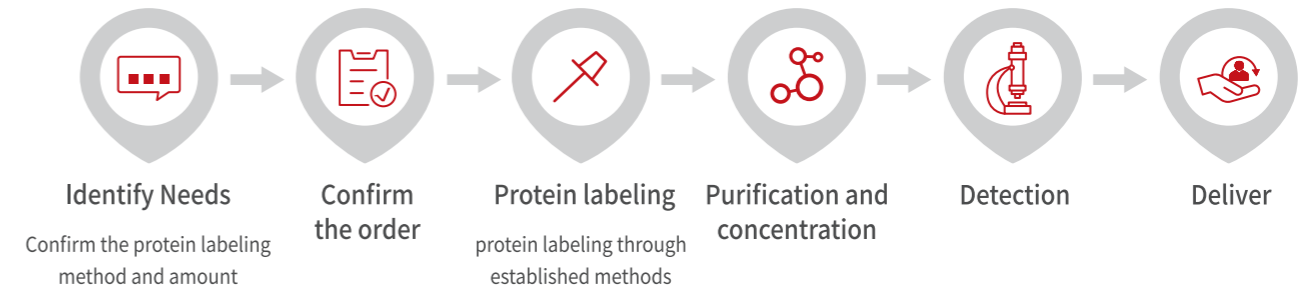


## 3. Protein Application

### 3.1 Protein Labeling >>>

Protein labeling is to label proteins with markers by appropriate methods. Labeled proteins are widely used in applications such as quantification, localization, interaction analysis, post-translational modification studies, and functional assays. Common markers include fluorescent protein dyes, enzyme conjugated proteins, and small molecule markers. We provide a range of labeling services such as PE, APC, FITC, 350, 488, 555, 647, as well as biotin to meet different needs.

### Service Process



### 3.2 Develop Diagnostic Reagent >>>

We offer diagnostic reagent development services based on our well-established microsphere and antibody development platforms. Our diagnostic product portfolio includes magnetic particle-based chemiluminescence, colloidal gold, and time-resolved microsphere assays. Customers provide the concept or specific requirements, and we deliver the final product using independently developed key raw materials, ensuring stable quality and cost-effectiveness.