

Affinity chromatography resins

UniMab series Protein A affinity resins >>>

To increase the purification efficiency of monoclonal antibodies (mAb) and recombinant Fc-fragment proteins, NanoMicro has developed world-leading protein A affinity resins, UniMab. Based on rigid mono-sized polymethacrylate particles with excellent surface hydrophilization, the resin has minimal non-specific binding and high mechanical strength for fast flow operation. Its optimal surface bonding and leading genetic-engineered rProtein A ligand provide excellent Fc-binding selectivity, base stability, and low leachate. UniMab has proven its robust performance in many successful applications including bioprocessing purification of marketed and phase III of mAb drugs.

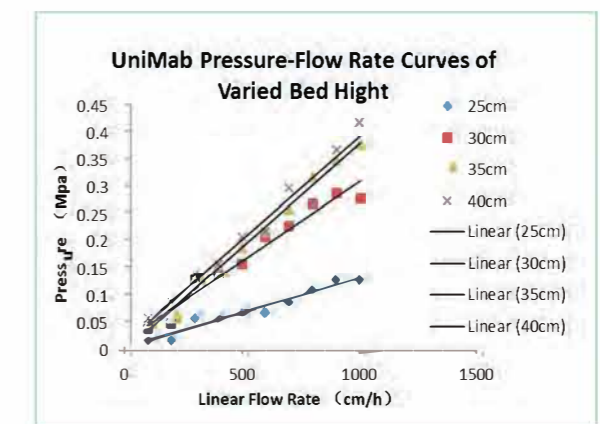
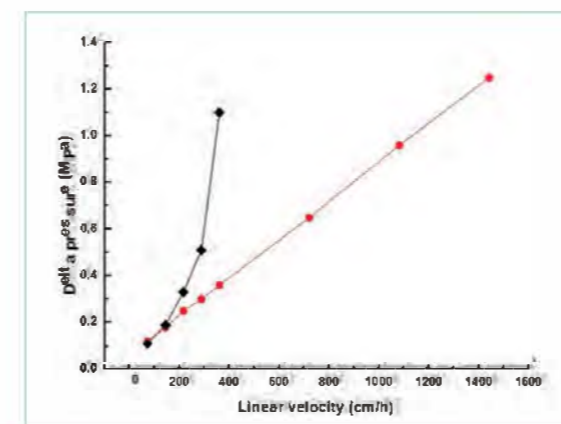
Characteristics UniMab series resins

Product name	UniMab 50HC	UniMab 50
Chromatography technique	Antibody affinity	
Matrix	Polymethacrylate	
Particle size	50 μm	50 μm
Ligand	recombinant protein A	
Dynamic binding capacity (Human IgG, 6 min residence time)	$\sim 50 \text{ mg}\cdot\text{mL}^{-1}$	$\sim 40 \text{ mg}\cdot\text{mL}^{-1}$
Maximum pressure	0.8 MPa	
Clean in place	0.1-0.5 M NaOH	
Recommended flow rate	100-800 cm/h	
pH Stability	3~12 (operational), 2~13(CIP)	
Chemical stability	Stable in commonly used buffers, 0.1 M HAC, 0.1 M HCl, 20% ethanol, isopropyl alcohol, etc. Avoid long-term exposure to strong acids or strong bases.	
Operational temperature	2-40 $^{\circ}\text{C}$	
Storage	20% ethanol, 2-8 $^{\circ}\text{C}$	

Highlights of UniMab

High Mechanical Strength

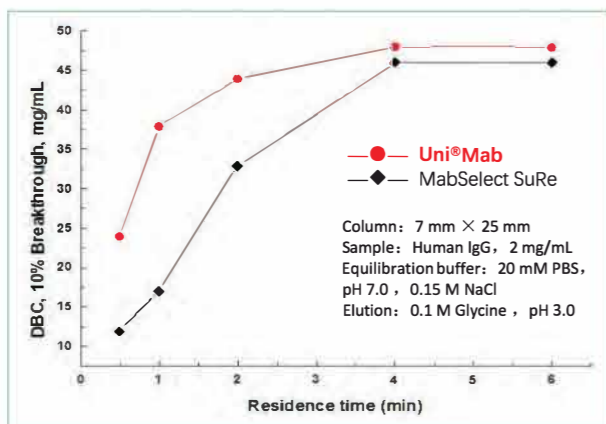
Due to its rigid and mono-sized matrix, UniMab has superior mechanic strength for high flow rate and low back pressure. This allows our customers to pack larger column bed height and/or operate at higher flow rate, improving process productivity.



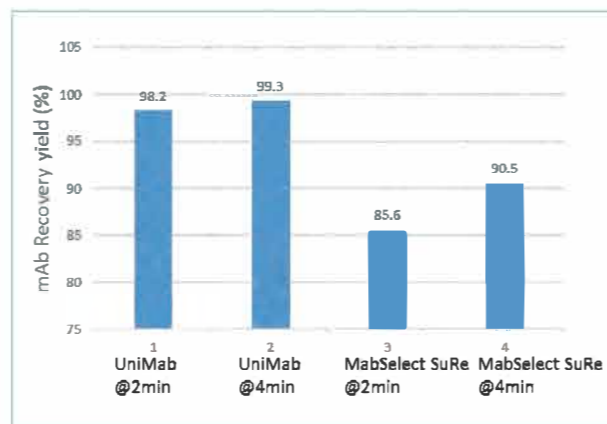
Comparison of UniMab and a conventional agarose-type protein A resin in pressure vs. flow rate characteristics

High dynamic binding capacity and high recovery yield at high flow rate

Because of its mono-sized nature and optimal pore size, UniMab has high mass transfer and exhibits significantly better dynamic binding capacity (DBC) and recovery yield than that of the conventional agarose-type protein A resin in short residence time.



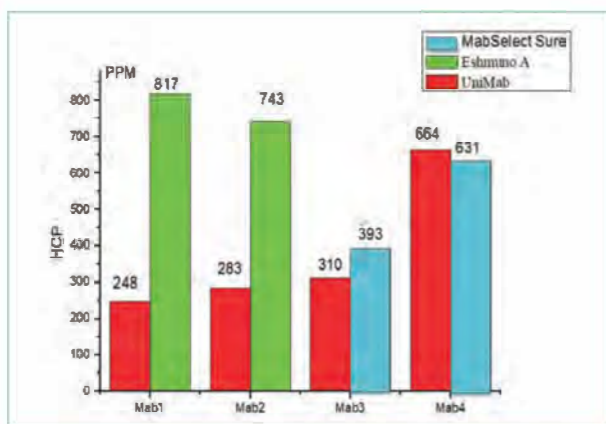
Comparison of mAb DBC at varied residence time



Comparison of mAb recovery yield at varied residence time

Minimal non-specific binding and low HCP

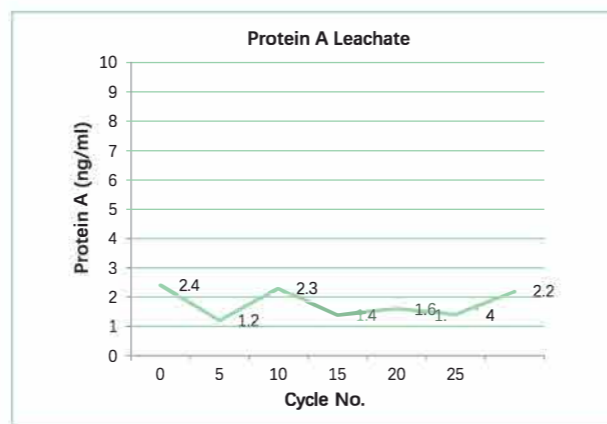
UniMab provides highly competitive mAb affinity specificity and very low HCP concentration during mAb purification.



Comparison of HCP impurity concentration in the purification of varied mAbs

Very low protein A leachate

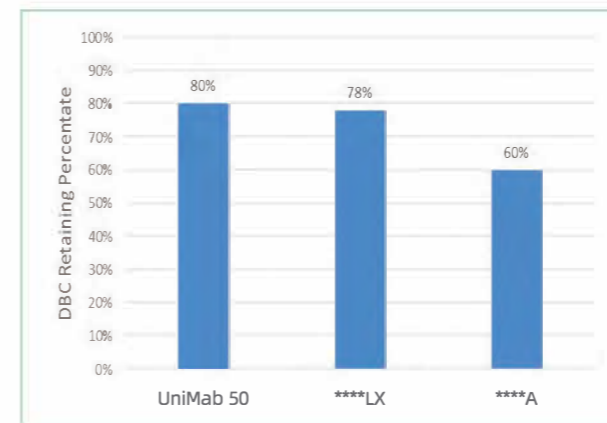
Because of its optimal surface bonding as well as robust, engineered rProtein A ligand, UniMab exhibits very low level of protein A leachate in application.



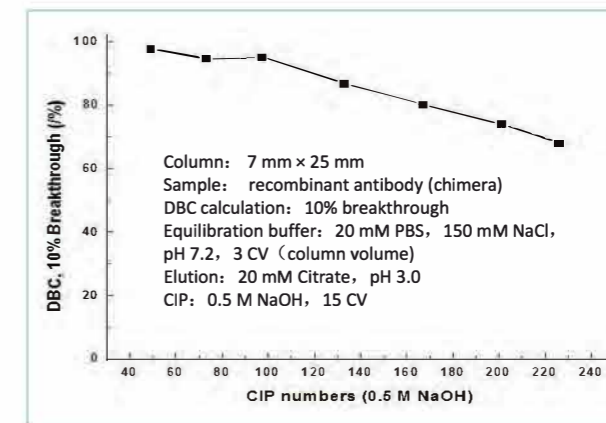
UniMab demonstrates consistently low level (<5 ng/ml) of protein A leachate in varied cycles of use

Superior alkaline stability

UniMab's optimal surface bonding and leading engineered rProtein A ligand also provides excellent alkaline stability that enables the use of 0.1-0.5M NaOH as the CIP condition and extends its life cycles.

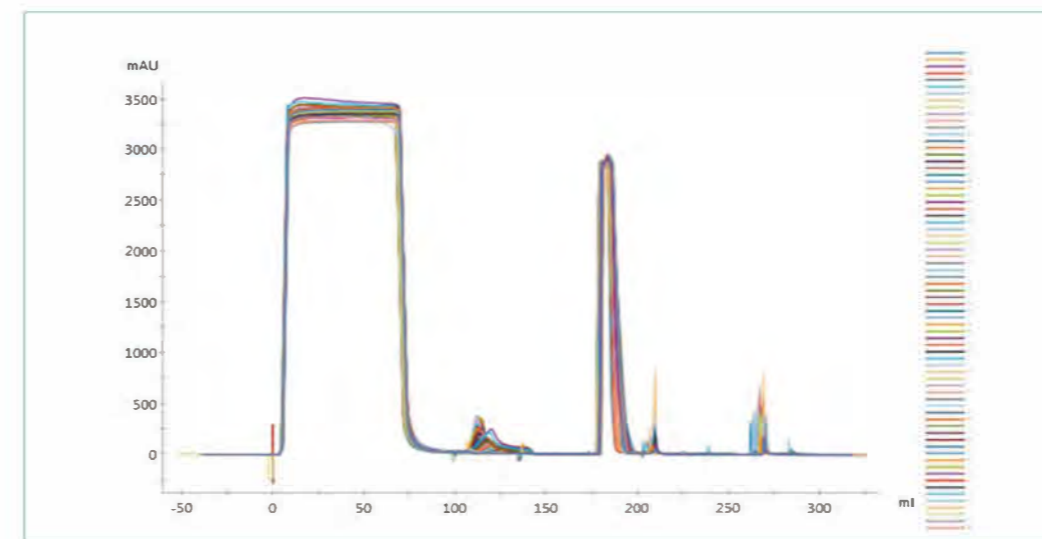


DBC retaining percentage of varied protein A resins after soaking in 0.5M NaOH for 24 Hours



UniMab life cycle tests of mAb DBC stability under 0.5 M NaOH CIP treatment

High reproducibility



UniMab's chromatogram overlay of 150 cycles of mAb purification

NMab series Protein A affinity resins >>>

NMab series Protein A affinity resins are based on highly cross-linked agarose matrices that bond alkaline-stable recombinant protein A ligands, providing cost-effective solutions for the rapid processing of monoclonal and polyclonal antibodies, bispecific antibodies, and high-quality Fc fusion constructs.

- Rigid particles with outstanding pressure-flow rate properties; easy linear scale-up
- Efficient mass transfer; high dynamic binding capacity; small elution volumes
- Minimal non-specific binding; excellent antibody yield
- Animal component-free production; full technical and regulatory support

The NMab series comprises three products: NMab, NMab Pro, and NMab Titan. NMab has the largest particle size and therefore is suitable for faster flow rate. NMab Pro has the highest binding capacity, while NMab Titan has superior mechanical strength and alkaline stability.

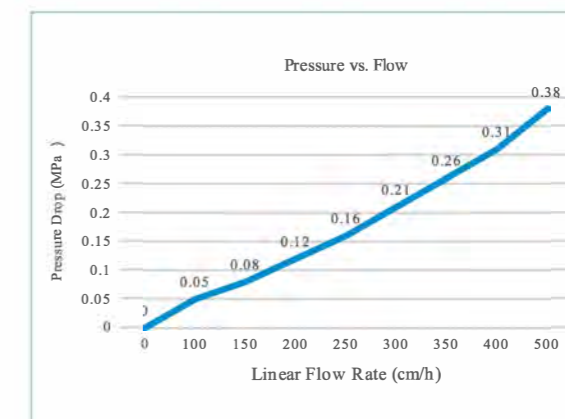
Characteristics of NMab series Protein A affinity resins

Product name	NMab	NMab Pro	NMab Titan
Matrix	Highly cross-linked agarose bead		
Particle size	~90 μm	~69 μm	~75 μm
Ligand	Recombinant protein A		
Dynamic binding capacity (Human IgG, 6 min residence time)	$\geq 55 \text{ mg}\cdot\text{mL}^{-1}$	$\geq 65 \text{ mg}\cdot\text{mL}^{-1}$	~70 $\text{mg}\cdot\text{mL}^{-1}$
Maximum pressure	0.3 MPa		
Clean in place	0.1-0.5 M NaOH		
Recommended flow rate	100-500 cm/h	100-500 cm/h	500 cm/h (I.D.: 500 mm, H: 250 mm)
pH stability	3-12 (operational), 2-13 (CIP)		
Chemical stability	Stable in commonly used buffers, 0.1 M HAc, 0.1 M HCl, 20% ethanol, isopropyl alcohol, etc. Avoid long-term exposure to strong acids or strong bases.		
Storage	20% ethanol or 2% benzyl alcohol, 2-8 $^{\circ}\text{C}$		

Highlights of NMab Pro

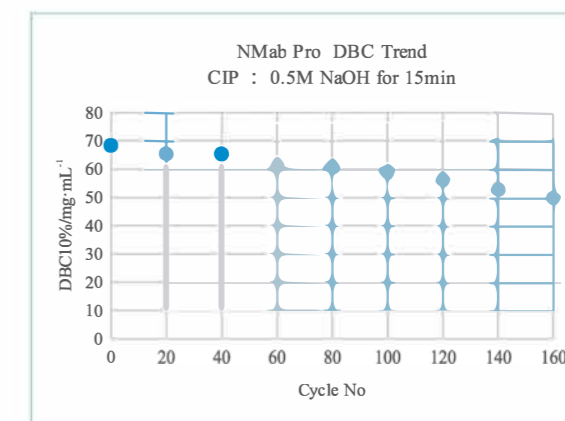
High mechanical strength

NMab Pro has better mechanical strength than conventional agarose resins due to its unique, extensive crosslinking chemistry, providing good pressure-flow rate characteristics in process scale chromatography columns.



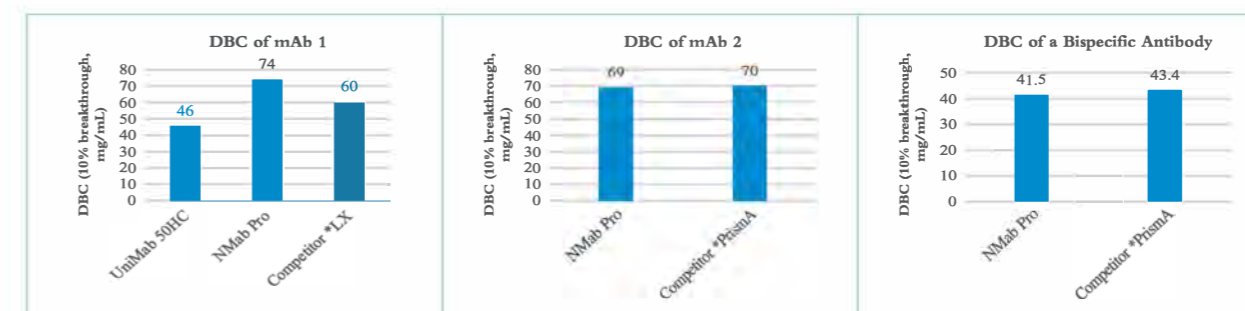
Superior alkaline stability

Due to the use of NanoMicro's proprietary, engineered protein A ligand (Patent CN202012747812.8), NMab Pro exhibits excellent alkaline resistance and can tolerate routine CIP with 0.5M NaOH. Dynamic binding capacity remains relatively constant through ca. 160 purification cycles which employ a 15-minute CIP of 0.5 M NaOH after each cycle.



High dynamic binding capacity

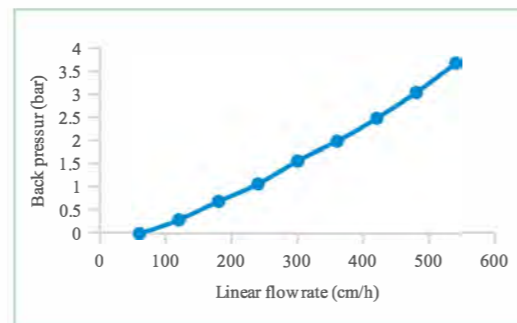
NMab Pro exhibits highly competitive dynamic binding capacity of mAbs and bispecific antibodies.



Highlights of NMab Titan

Robust mechanical properties with low back pressure for industrial-scale purification

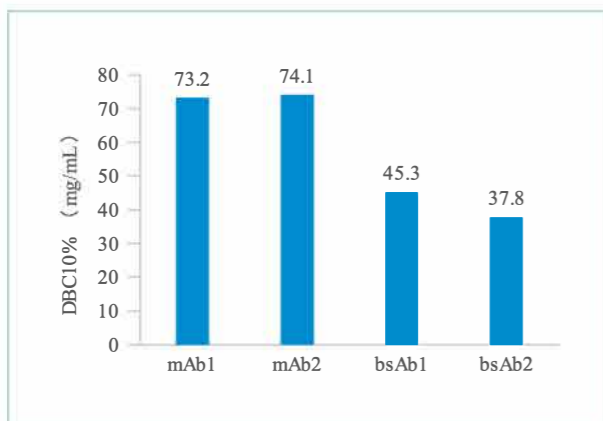
NMab Titan resin displays robust mechanical properties and low back pressure at high linear flow rates. This allows increased column bed heights in process-scale operations, resulting in efficient and cost-effective purification of mAbs and other Fc-containing biomolecules with high throughput.



Pressure-flow curve of NMab Titan.
(Column, ID: 600mm, H: 247mm; mobile phase: water)

Designed for high productivity

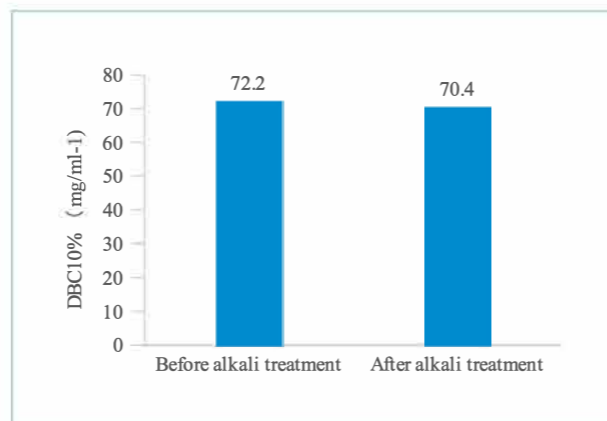
NMab Titan is a protein A resin specifically designed for antibodies capturing with high productivity. As illustrated in Figure below, NMab Titan features an increased dynamic binding capacity towards various cell culture harvests of mAbs and bsAbs, thanks to its custom-designed protein A ligands. The productivity improvement and cost reduction offer a competitive advantage in the purification process.



NMab Titan is designed for high productivity of mAbs and bsAbs (Retention time: 6 min).

Improved alkaline stability allows better process economy

After incubation in 0.5 M NaOH at 25°C for 24 hours, the binding capacity (mAb) of NMab Titan decreased only 2.5%, indicating excellent alkali resistance. This significantly improves the resin lifetime in antibody purification, enhances production efficiency, and reduces production costs.



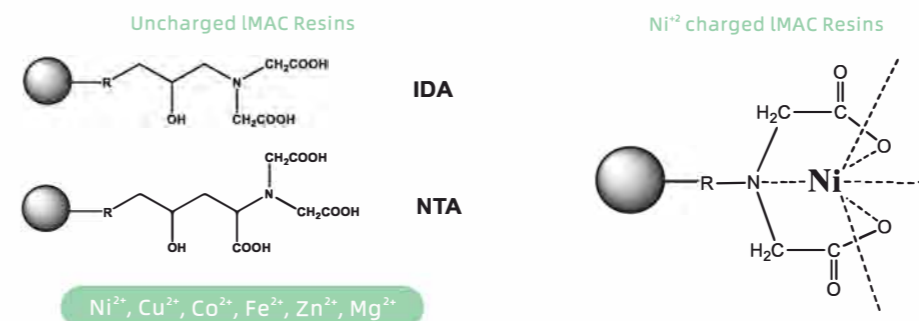
Alkaline stability study of NMab Titan by using 0.5 M NaOH at 25°C for 24 hours.

Ordering information

Product name	Cat. No.	Package size
UniMab 50	17010-050100	30mL, 100mL, 500mL, 1L, 5L, 10L, 50L, 100L
UniMab 50HC	17010-250100	
NMab	17013-090100	
NMab Pro	17013-070100	
NMab Titan	17013-080100	

NW Rose series IMAC resins >>>

Immobilized metal ion affinity chromatography (IMAC) resins are commonly used to purify his-tagged proteins, but also untagged recombinant or native proteins. The affinity chemistry is based on the coordination bonding between protein surface amino groups (histidine, tryptophan, cysteine, etc.) and transition metal ions (Ni²⁺, Co²⁺, etc.) immobilized on the resins. NanoMicro's IMAC resins are made from cross-linked agarose matrices that carry two different types of chelating ligands. NanoMicro offers Ni²⁺ charged IMAC resin products, NW Rose Ni FF and NW Rose TED FF, as well as uncharged IMAC resins, NW Rose IMAC FF, which can chelate with varied metal ions such as Cu²⁺, Ni²⁺, Zn²⁺ and Co²⁺.



Characteristics of IMAC Resins

Product name	NW Rose Ni FF	NW Rose TED FF	NW Rose IMAC FF
Matrix	Cross-linked agarose		
Particle size	45-165 μm		
Ligand	NTA	TED	NTA
Maximum pressure	0.3 MPa		
pH stability	3-12 (operational), 2-14 (CIP, Ni ²⁺ must be removed)	3-12 (operational), 2-14 (CIP)	3-12 (operational), 2-14 (CIP, Ni ²⁺ must be removed)
Storage	20% ethanol, 4-30 °C	20% ethanol, 4-30 °C	20% ethanol, 4-30 °C

Highlights of IMAC Resins

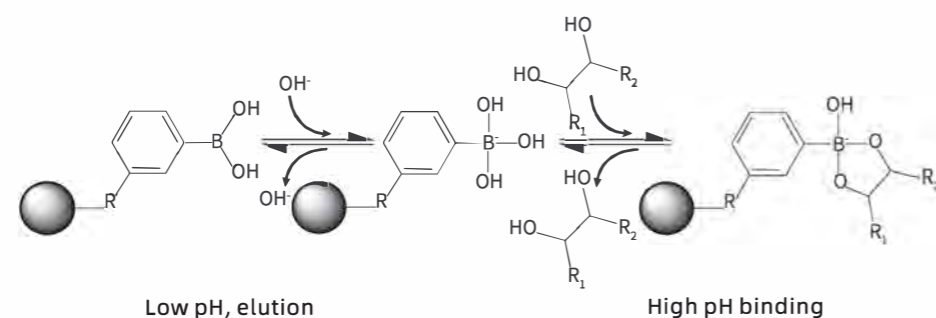
- Rigid matrix enables high flow rate operation
- High dynamic binding capacity
- Fast, reliable scale-up of his-tag purification
- Compatible for reducing agents, detergents and other additives

Ordering information

Product name	Cat. No.	Package size
NW Rose Ni FF	60042-531800	25mL, 100mL, 500mL, 1L, 5L, 10L
NW Rose TED FF	60042-371301	
NW Rose IMAC FF	60042-092100	

Boronic acid affinity chromatography resin >>>

NanoMicro has launched a new generation of boronic acid affinity packings in which boronic acid forms a coordination compound with cis-diol for separation and purification. Under alkaline conditions, boronic acid functional group interacts with the cis isomer of a 1,2-diol forming a stable five-membered cyclic adduct of cis-diol molecules and boronic acid on the stationary phase. Under acidic conditions, the adduct ring opens releasing the target molecules. Boronic acid affinity media are employed in the separation and purification of compounds containing cis-diol groups such as glycoproteins, nucleosides, nucleotides, sugars, etc.



Characteristics of UniPB-80L resin

Product name	UniPB-80L
Matrix	Monodisperse poly (methyl methacrylate), PMMA beads
Particle size	~80 μm
Ligand	Phenyl boronic acid
Maximum pressure	0.5 MPa
pH stability	2-12 (operational), 2-13 (CIP)
Storage	20% ethanol, 2-8 $^{\circ}\text{C}$

Highlights of UniPB-80L

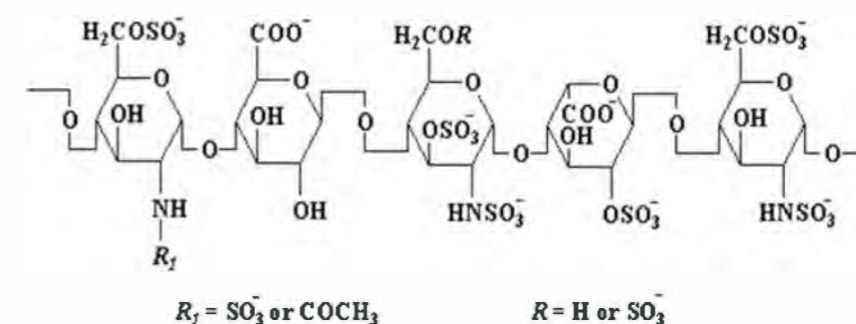
- Monodisperse microspheres as packing substrate
- Enabling high flow rate to raise productivity
- High ligand density providing very high binding capacity
- Very long service life reducing manufacturing cost

Ordering information

Product name	Cat. No.	Package size
UniPB-80L	04000-080001	30mL, 100mL, 500mL, 1L, 5L, 10L, 50L, 100L

Heparin affinity chromatography resin >>>

Heparin is a linear and highly sulfated glycosaminoglycan which has anti-coagulant properties. Due to its polyanionic nature, heparin interacts with a wide range of biomolecules including plasma coagulation proteins, lipoprotein lipase, collagenase, and DNA polymerase. Immobilized heparin is widely used as an adsorbent in affinity chromatography for the purification of biological substances. NanoMicro has developed high performance heparin affinity resin UniGel-65 Heparin using monodisperse crosslinked polymethacrylate matrix with excellent surface hydrophilization. UniGel-65 Heparin has optimal pore size and ligand coupling chemistry that yield competitive binding capacity. In addition, this rigid resin with mono-sized nature provides superior mechanic strength for fast flow operation. Its overall robust performance has enabled UniGel-65 Heparin to be a good choice for bioprocessing heparin affinity chromatography as well as sample preparation sorbent. Besides UniGel-65 Heparin, NanoMicro also offers an agarose-based Heparin affinity resin product, NM90 Agarose Heparin.



Characteristics of Heparin affinity resins

Product name	UniGel-65 Heparin	NM90 Agarose Heparin
Matrix	Monodisperse Poly (methyl methacrylate), PMMA beads	Crosslinked agarose beads
Particle size	~65 μm	~90 μm
Ligand	Heparin	Heparin
Ligand density	~ 3 mg/mL (AT III)	~ 5mg/mL (AT III)
Maximum pressure	0.8 MPa	0.3 MPa
pH stability	4-12	4-12
Storage	20% ethanol, 4-25 $^{\circ}\text{C}$	20% ethanol, 4-25 $^{\circ}\text{C}$

Highlights of UniGel-65 Heparin

- Rigid matrix enables to operate at fast flow for high productivity
- Optimal ligand coupling provides highly competitive dynamic binding capacity
- Mono-sized matrix yields the robust performance in varied applications including not only bioprocessing
- Purification but also SPE sample preparation

Ordering information

Product name	Cat. No.	Package size
UniGel-65 Heparin	17012-065100	30mL, 100mL, 500mL, 1L, 5L, 10L, 50L, 100L
NM90 Agarose Heparin	17012-090001	

Plasmid affinity chromatography resin >>>

NW Rose Plasmid and NW Rose Plus Plasmid are two thiophilic aromatic adsorption chromatography resins, which are based on agarose microspheres beads. They possess a selectivity that enables the separation of supercoiled, covalently closed circular forms of plasmid DNA from open circular forms. Both NW Rose Plasmid and NW Rose Plus Plasmid feature an optimized 2-mercaptopyridine ligand density, enabling a high binding capacity for high molecular weight supercoiled DNA, even at high flow rates.

Characteristics of NW Rose Plasmid and NW Rose Plus Plasmid affinity resins

Product name	NW Rose Plasmid	NW Rose Plus Plasmid
Matrix	Cross-linked agarose bead	Highly cross-linked agarose bead
Ligand	2-mercaptopyridine	
Particle Size	43-53 μm	50-60 μm
DBC	$\sim 2 \text{ mg}\cdot\text{mL}^{-1}$	$\sim 4 \text{ mg}\cdot\text{mL}^{-1}$
Maximum Pressure	0.3 MPa	
Recommended Flow rate	200 cm/h(50/30 column ID 50 mm, h=10 cm)	
Maximum flow rate	300 cm/h(50/30 column ID 50 mm, h=10 cm)	500 cm/h(50/30 column ID 50 mm, h=10 cm)
pH stability	2-12 (working), 2-14 (CIP, short term)	
Chemical stability	Common aqueous chromatography solution, including 0.1M NaOH, 8M urea, 6M guanidine hydrochloride, 70% ethanol, 30% isopropanol, 1% SDS, etc.	
Storage	20% ethanol, 4-30°C	

Highlights of NW Rose Plasmid and NW Rose Plus Plasmid

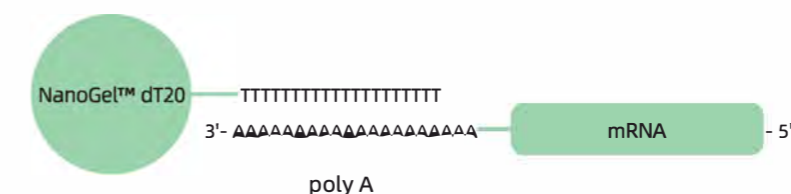
- The high cross-linked matrix allows for operation at a high flow rate
- Its specificity leading to a high purity and yield, making it suitable for the production of high-quality plasmid DNA
- Withstand harsh conditions, including high salt, high pH, and high temperature, ensuring consistent performance across various environments

Ordering information

Product name	Cat. No.	Package size
NW Rose Plasmid	60043-402400	25mL, 100mL, 500mL, 1L, 5L, 10L
NW Rose Plus Plasmid	60043-402401	

Oligo (dT20) affinity resin >>>

The NanoGel dT20 affinity resin is specifically designed for the purification of messenger RNA (mRNA). It features a rigid poly(styrene-divinylbenzene) (PS-DVB) bead matrix, which offers uniform particle size and a large open pore structure. This bead matrix is coated with a polyhydroxyl surface, resulting in low non-specific binding. The surface is further functionalized with poly oligo (dT20), enabling the resin to capture mRNA through base pairing with the polyA tail of mRNA.



Characteristics of NanoGel dT20 affinity resin

Product name	NanoGel dT20
Matrix	Monodisperse Poly(styrene-divinylbenzene) bead
Particle size	$\sim 50 \mu\text{m}$
Ligand	dT-20 mer
Dynamic binding capacity	$\sim 2 \text{ mg/mL}$ (mRNA)
Maximum pressure	3 MPa
pH stability	2-13
Storage	20% ethanol, 2-8 °C

Highlights of NanoGel dT20

- Rigid matrix enables to operate at fast flow for high productivity
- Highly competitive dynamic binding capacity
- Mono-sized matrix yields the robust performance in varied applications including not only bioprocessing
- Withstand harsh conditions such as high salt, high pH, and high temperature, ensuring consistent performance in various environments

Ordering information

Product name	Cat. No.	Package size
NanoGel dT20	17030-050150	25mL, 100mL, 500mL, 1L, 5L, 10L