OUR PRODUCTS

Your support for accurate and targeted protein research

Cube Biotech

Contents

PROTEINS ARE OUR PASSION

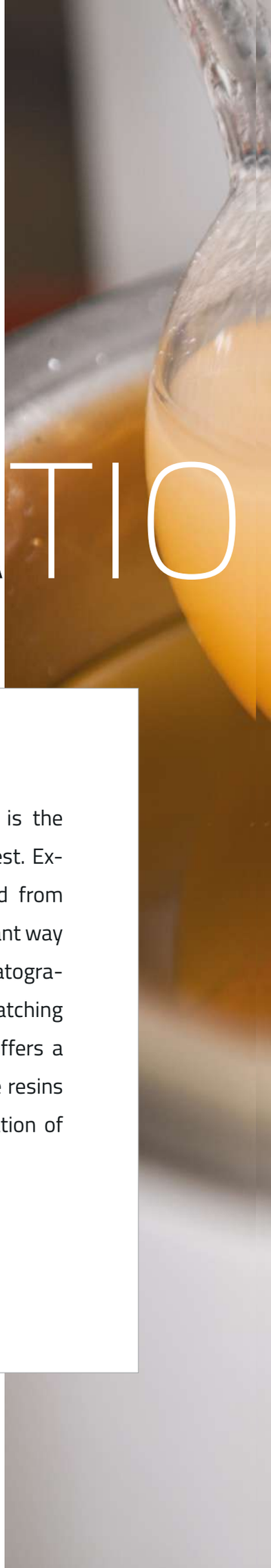
The Cube Biotech team serves the biotechnological and the pharmaceutical community with its expertise regarding expression, purification, stabilization and characterization of proteins. Our projects focus mainly on the pharmaceutically relevant class of membrane proteins. Our biggest strength is that we are service providers as well as manufacturers:

We sell what we use and we use what we sell.

A broad range of protein purification and stabilization products are produced in house ensuring a high quality. Our product offering is complemented by reagents such as detergents, cell-free expression lysates, nanodiscs, and patented membrane protein crystallization plates. Some particularly relevant membrane proteins (GPCRs) are available as fully characterized preparations.

Our services cover the expression, purification, stabilization and characterization of soluble proteins and membrane proteins for applications like cryo-electron microscopy, antibody generation, crystallization and assays.

PROTEIN PURIFICATIO



The basis of all protein research is the purification of the protein of interest. Expressed proteins can be extracted from cell lysates or membranes. An elegant way to achieve purity is affinity chromatography aided by affinity tags and matching purification resins. Cube Biotech offers a broad range of purification agarose resins or magnetic beads for the purification of functional proteins.

His Affinity

Available Matrices Overview

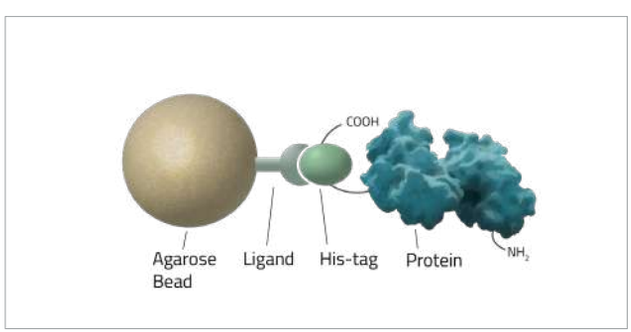
With our long-standing expertise in chemical synthesis, we are able to manufacture matrices for His affinity purification that match all requirements.

Features of our His-affinity Chromatography Matrices

Beads	Agarose resin, MagBeads
Average bead sizes	30 µm, 40 µm, 100 µm, 400 µm (XL), other sizes on request
Ligands	Ni-NTA, Co-NTA, Zn-NTA, Cu-NTA, INDIGO

The Beads: Agarose Resin

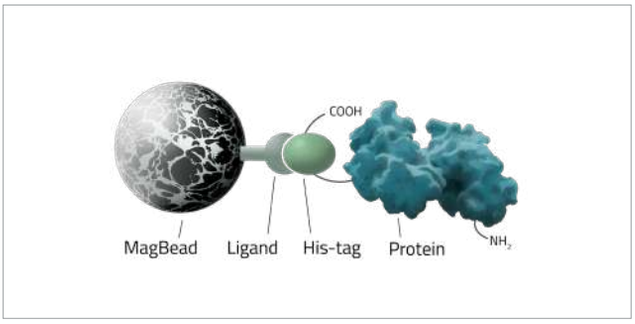
Agarose resin is the most frequently used form of affinity beads. It is ideal for routine applications as it allows an easy setup, making it suitable for gravity-flow, low-speed-centrifugation, low-pressure procedures and FPLC.



Agarose Bead and polyhistidine-tag interaction.

The Beads: Magbeads

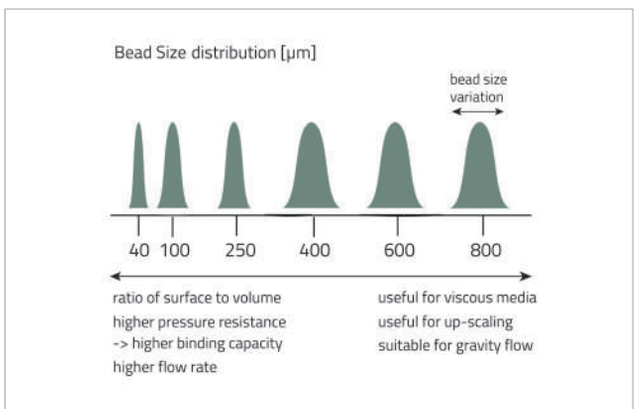
The magnetic bead contains many magnetite cores which are covered in agarose. MagBeads fulfill the same purpose as agarose resin. Their main advantage, however is the little equipment required to use them which is only a tube and a magnet.



MagBead and polyhistidine-tag interaction.

The Bead Size

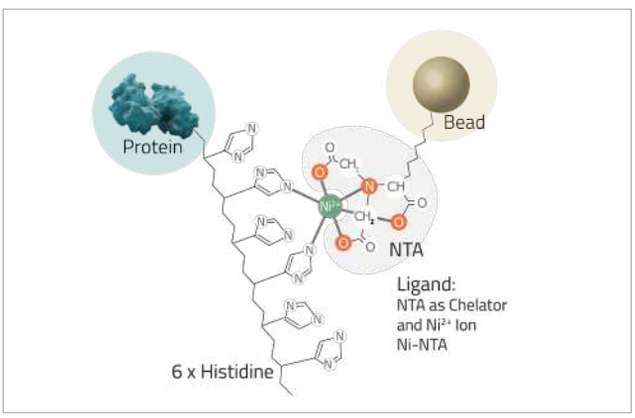
The bigger the beads are in diameter the higher the flow rates during protein purification. However, having a slower flow rate usually increases the protein yield, as smaller beads have a higher surface to volume ratio. Therefore, the same volume of smaller beads can bind more protein than beads of bigger sizes.



Overview of different agarose resin bead sizes and their respective advantages.

The Ligand

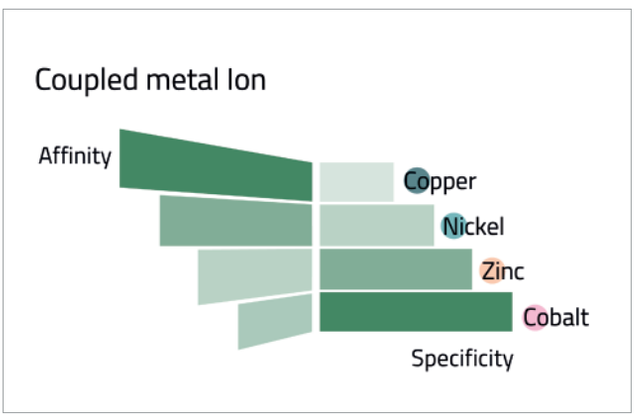
Nitrilotriacetic acid (NTA) is the most commonly used ligand. INDIGO was developed and patented by Cube Biotech. The ligand is coupled to the metal ion in a chelator complex.



Schematic depiction of a chelator complex consisting of NTA and a Ni^{2+}-ion.

The Coupled Metal Ion of NTA Agarose Ligand

Depending on which metal ion is coupled to the ligand, the affinity and specificity of the His-tag purification changes. Rule of thumb: The higher the protein yield, the less specific the purification becomes.



Overview of the most commonly used metal ions for His-tag protein purification.

His Affinity

Ni-NTA Matrices

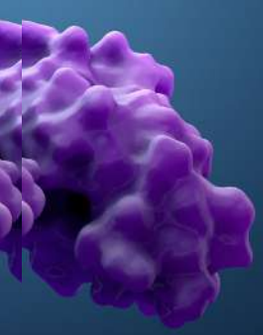
Ni-NTA is the most commonly used affinity matrix for His-tag protein purification.

The term Ni-NTA refers to a Ni^{2+}-ion that has been coupled to Nitrilotriacetic acid (NTA). Ni-NTA can then be coupled to agarose resin or magnetic beads for IMAC (Immobilized metal chelate affinity chromatography). This product combines market-leading performance and ultimate flexibility. It provides high yields during batch spin and FPLC. A washing and regeneration protocol for the product is available.

> Strikes a good balance between protein yield and purification specificity

Product Range	Article No.	Bead Size	Binding Capacity	Filling Quantity	Specificity of Interaction
PureCube 100 Ni-NTA Agarose (10 ml)	74103	100 µm	>80 mg/ml	Delivered as a 50 % suspension	>1 µM (Kd)
Ni-NTA Mag-Beads (25 ml)	31225	30 µm		Delivered as a 25 % suspension	

Additional Product Range	**Article No.**
PureCube Ni-NTA Agarose XL (10 ml)	55103
PureCube Ni-NTA MagBeads XL (5 ml)	55305
PureCube Ni-NTA Agarose (10 ml)	31103
PentaHis antibody, BSA-free (0.1 mg)	40040



Co-NTA

Achieving the Highest Purity

Some experiments require higher purity yields then Ni-NTA can provide. Luckily there is no need to change to another affinity tag to achieve this.

Co-NTA can greatly increase protein purity during purification. However, its binding capacity is reduced when compared to Ni-NTA. Binding Capacity: 40 mg/ml as Agarose and 30 mg/ml as MagBeads. Which is still far above other affinity tags.

His Affinity

INDIGO-Ni Matrices

INDIGO-Ni Agarose is a combination of our novel, proprietary INDIGO ligand, loaded with nickel ions and has an affinity to His-tagged proteins.

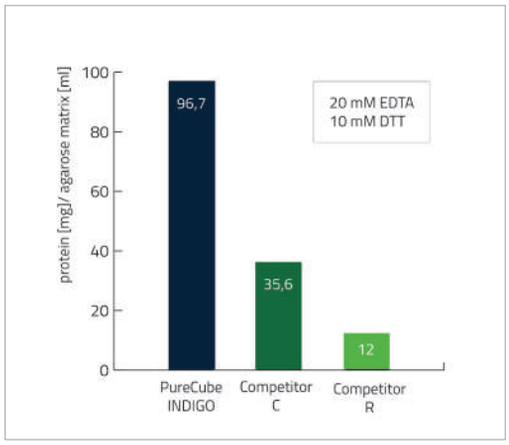
We developed a new ligand named INDIGO.

Besides its highly superior EDTA and DTT stability (see figure), its affinity is on par with traditional Ni-Agarose resins, while simultaneously having a highly increased specificity and therefore purity. Washing & regeneration protocols are available.

INDIGO-Ni Agarose outperforms both competitor products in the presence of 20 mM EDTA and 20 mM DTT.

His-tagged GFP protein was purified from *E. coli* cell lysates with INDIGO-Ni and agarose or comparable products from suppliers C. or R. Yields were determined by spectrophotometry.

His-tagged GFP purified with PureCube 100 INDIGO Ni-Agarose and two leading competitor matrices. Buffer conditions: Sodium phosphate buffer pH 7.4, 10 mM DTT, 20 mM EDTA. Imidazole concentrations: Binding step: 10 mM, Wash: 20 mM, Elution: 250 mM.



Product Range	Article No.	Bead Size	Binding Capacity	Filling Quantity	Specificity of Interaction
PureCube 100 INDIGO Ni-Agarose (10 ml) 	75103	100 µm	>100 mg/ml	Delivered as a 50 % suspension	>10 µM (Kd)
PureCube INDIGO Ni-MagBeads (25 ml)	75225	30 µm		Delivered as a 25 % suspension	

Additional Product Range	Article No.
HisCube - Ni-INDIGO His-Tag Protein Purification MINI Kit	80101
HisCube - Ni-INDIGO His-Tag Protein Purification MIDI Kit	80105

Rho1D4 Affinity

Rho 1D4 Antigen Matrices

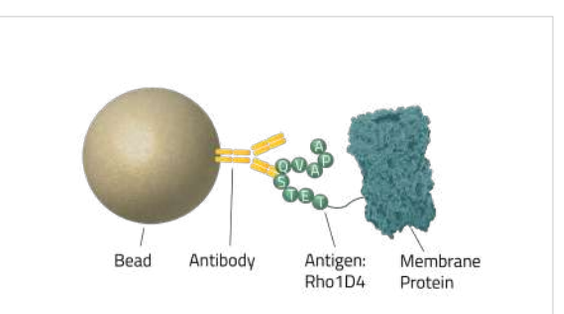
Rho1D4 protein purification assays combine incredibly high specificity with good protein yield and maximum purity. This makes them ideal for membrane protein purification.

Product Range	Article No.	Bead Size	Binding Capacity	Filling Quantity	Specificity of Interaction
PureCube Rho1D4 Agarose (1ml)	33101	40 µm	3-4 mg/ml	Delivered as a 50 % suspension	20 nM (Kd)
PureCube Rho1D4 MagBeads (1ml)	33201	30 µm		Delivered as a 5 % suspension	

Additional Product Range	Article No.
PureCube Rho1D4 Agarose XL (1 ml)	57601
PureCube Rho1D4 MagBeads XL (1 ml)	57701
Rho1D4 antibody (0.2 mg)	40020
Rho1D4 peptide (5 mg)	16201
GST-eGFP fusion protein, Rho1D4-tag (50 µg)	29911
Rho Starter Set 1: PureCube Rho1D4 Agarose (1 ml) + Rho1D4 peptide (5 mg)	33199
Rho Starter Set 2: PureCube Rho1D4 MagBeads (1 ml) + Rho1D4 peptide (5 mg)	33299

> We recommend to use the Rho1D4-tag especially for the purification of proteins with low abundance like membrane proteins.

Compared to their soluble counterparts membrane proteins often have low abundance. Therefore, the specificity of their purification assays must be high to avoid that other proteins are purified alongside them. As even a small amount of unwanted protein could overshadow the membrane protein of interest.



Affinity bead and Rho1D4 antigen interaction.

GST Affinity

Glutathione Matrices

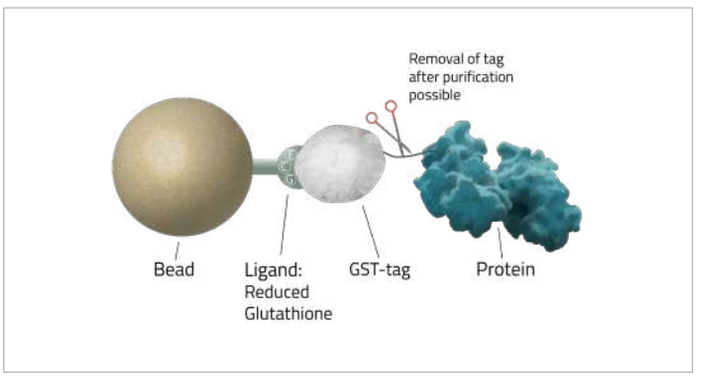
The comparably large Glutathione-S-transferase-tag provides an established and reliable way for protein purification assays that require the highest level of purity.

The GST-tag provides alternative protease cleavage sites and can be removed from the protein when required.

The GST affinity system exploits the high affinity of GST towards reduced Glutathione, its natural substrate. It's tag refers to a whole protein and it is ideal for pull-down experiments. The GST-tag can be combined with other affinity tags like Rho1D4.

Product Range	Article No.	Bead Size	Binding Capacity	Filling Quantity	Specificity of Interaction
PureCube Glutathione Agarose (10 ml)	32103	40 µm	>10 mg/ml	Delivered as a 50 % suspension	1 µM (Kd)
PureCube Glutathione MagBeads (5 ml)	32205	30 µm		Delivered as a 25 % suspension	

Additional Product Range	Article No.
PureCube Glutathione Agarose XL (10 ml)	57003
PureCube Glutathione MagBeads XL (5 ml)	57105
L-Glutathione reduced (25 g)	61035
GST antibody (0.1 mg)	40060



Affinity bead and GST-tag interaction.

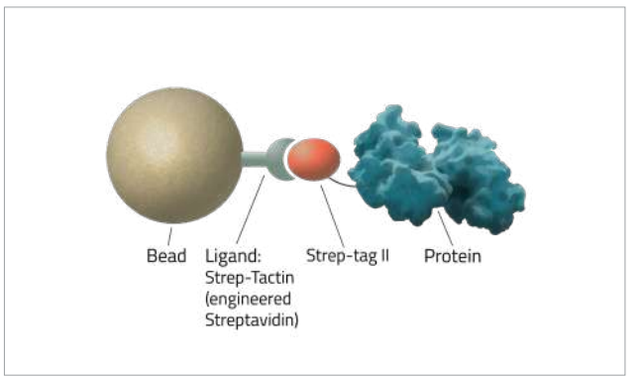
Strep Affinity

Strep-Tactin Matrices

The Strep-tag® purification system is based on the highly selective binding of engineered streptavidin, called Strep-Tactin, to Strep-tag II fusion proteins.

Strep-Tactin matrices are ideal for purification from cell culture supernatants or pull-down experiments. They are perfectly suited for chromogenic and chemiluminescence western blots.

> High purity in just one elution step.



Affinity bead and Strep-tag interaction.

The Strep-tag II can selectively bind to Strep-Tactin columns, which is a variant of streptavidin.

Product Range	Article No.	Bead Size	Binding Capacity	Filling Quantity	Specificity of Interaction
PureCube HiCap StrepTactin Agarose (10 ml)	34103	100 µm	5 mg/ml	Delivered as a 50 % suspension	300 nM (Kd)
PureCube HiCap StrepTactin Mag-Beads (5 ml)	34205	30 µm	7 mg/ml	Delivered as a 5 % suspension	

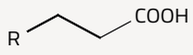
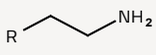
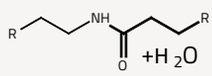
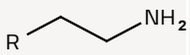
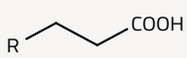
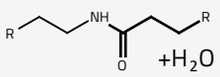
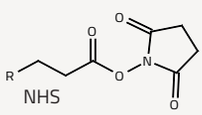
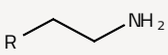
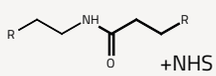
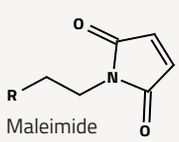
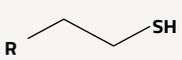
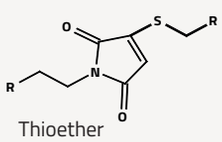
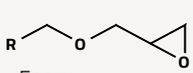
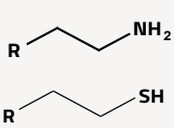
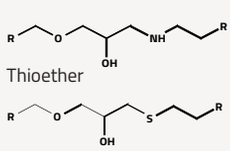
StrepTactin® and Strep-tag® are trademarks of IBA GmbH.

Additional Product Range	Article No.
PureCube HiCap Streptactin Agarose XL (10 ml)	57303
PureCube HiCap StrepTactin MagBeads XL (5 ml)	57405
Strep antibody (0.1 mg)	40070
Strep antibody HRP (0.075 ml)	40071

Activated Matrices

High-quality Agarose and Mag-Beads with Active Chemical Groups

A broad range of activated matrices for easy coupling of protein, peptide, chemical ligands and other biomolecules with matching groups for your laboratory.

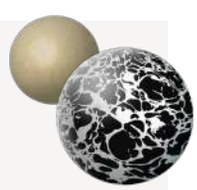
Product	Article No.	Reactive group on product	Reactive group on your molecule	Resulting bond structure	Comment
PureCube Carboxy MagBeads (5 ml) PureCube Carboxy Agarose (50 ml)	50205 50105	 Carboxy	 Amine	 Amide/peptide	Stable bond
PureCube Amine Activated MagBeads (5 ml) PureCube Amine Activated Agarose (50 ml)	50905 51005	 Amine	 Carboxy	 Amide/peptide	Stable bond
PureCube NHS Activated MagBeads (5 ml) PureCube NHS Activated Agarose (50 ml)	50405 50305	 NHS	 Amine	 Amide/peptide	Fast and easy protocol Stable bond
PureCube Maleimide Activated MagBeads (5 ml) PureCube Maleimide Activated Agarose (50 ml)	51205 51105	 Maleimide	 Thiol	 Thioether	For coupling via cysteines
PureCube Epoxy Activated MagBeads (5 ml) PureCube Epoxy Activated Agarose (50 ml)	50805 50705	 Epoxy	 Amine or Thiol	 Thioether Secondary amine	For thermostable proteins and small molecules

We provide off-the-shelf activated matrices for use in your laboratory. This includes a broad range of activation chemistries, simple coupling protocols and expert support.

Customized Matrices

High-quality agaroses and magnetic beads, customized for your application. Protein-specific matrices for increased purity & activity, even in the absence of affinity tags.

We offer the customized production of novel matrices, including expert design of coupling chemistry, matrices, linkers and spacers. Furthermore, we source or produce the ligands suited best for your project. To make sure our customers are completely satisfied with our service we provide pilot batches for evaluation that scale-up from 1 ml to 50 L. Our process is fully documented and detailed protocols and instructions are included.



Examples of Customizable Features

Surface Chemistry: Magnetic cores can be covered in a range of different materials, providing different properties (agarose, polyvinyl or silica).
Size: Different sizes impact the handling and purification results, as smaller beads provide higher surface binding properties, whereas larger beads are more suitable for viscous solutions.

Compatible with common chromatography systems like Äkta and Bio-Rad devices.
Excellent flow distribution and minimal void volume.
Resistant to most commonly used reagents & chemicals.

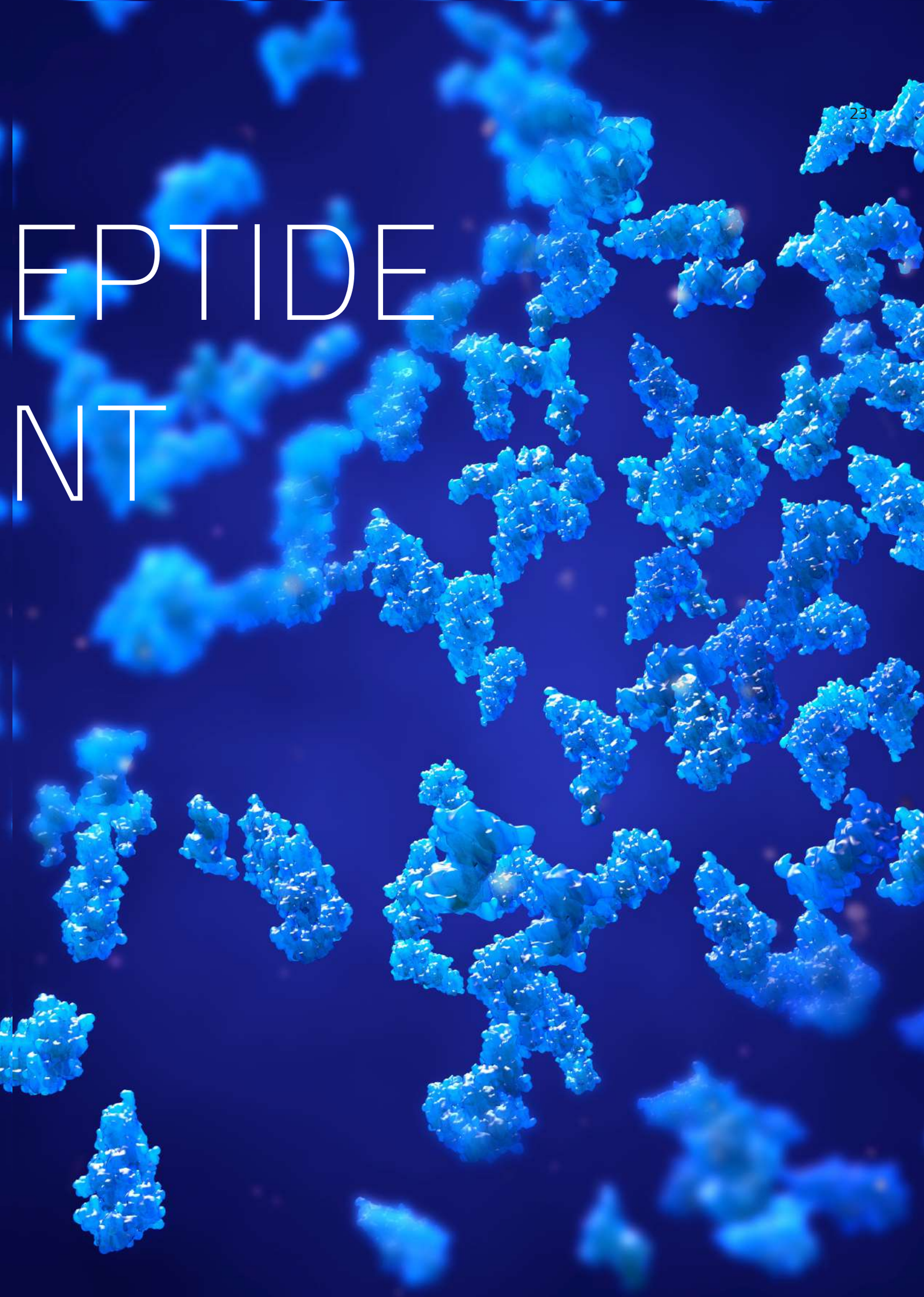
Pre-packed Cartridges

All our affinity agaroses are available as pre-packed cartridges in 1 ml and 5 ml sizes for protein purification on automated liquid chromatography/ FPLC™ systems.

PHOSPHOP
ENRICHME

Phosphorylation analysis provides many highly interesting insights into the cell's inner workings under different conditions. By today's estimations 30 % of all proteins get phosphorylated to some extent. Therefore, an effective and affordable enrichment method for these phosphopeptides is key for scientific advances.

EPTIDE
NT



Phosphopeptide Enrichment

By today's estimation 30 % of all proteins get phosphorylated to some extent. Cube Biotech provides multiple IMAC agarose resins and magnetic beads suited for phosphopeptide enrichment for mass spectrometry as well as phosphopeptide purification.

> Phosphopeptide enrichment enables highly interesting insights into the cell's inner workings under different conditions.

Cube Biotech's Fe-NTA MagBeads are superior to other phosphopeptide enrichment methods

Leutert et al. (2019) compared three types of IMAC beads (including our PureCube Fe-NTA) and TiO_2 microspheres. As shown below our PureCube Fe-NTA magnetic beads were the best option for phosphopeptide enrichment. With our Fe-NTA MagBeads the most unique phosphopeptides (Fig. 1A) were enriched with the highest efficiency (Fig. 1B).

Comparison of phosphopeptide enrichment performance between four products/ methods.
A: Number of unique phosphopeptides identified by the different enrichments (mean +/- SD, n = 3).
B: Phosphopeptide enrichment efficiency shown as the fraction of phosphorylated peptides over total peptides (mean +/- SD, n = 3).

Reference: Leutert, M., Rodríguez Mias, R., Fukuda, N. , & Villén, J. (2019). R2 P2 rapid robotic phosphoproteomics enables multidimensional cell signaling studies. Molecular systems biology, 15(12), e9021.

Product Range	Article No.	Bead Size	Filling Quantity	pH Stability	Chelator Stability	Other Stabilities
PureCube Fe-NTA Agarose (10 ml)	31403-Fe	40 µm	Delivered as a 50 % suspension	2-14	Stable in buffer containing 10 mM DTT & 1 mM EDTA	100 % methanol, 100 % ethanol, 100 % Isopropanol (v/v) acetonitrile, Ammonium Hydroxide (2.5 %), Deoxycholate; for about one hour: TFA (1 %), Formic acid (1 %)
PureCube Fe-NTA MagBeads (5 ml)	31505-Fe	30 µm	Delivered as a 25 % suspension			
PureCube Ti-NTA MagBeads (5 ml)	31505-Ti	30 µm	Delivered as a 25 % suspension			

MEMBRANE PROTEIN STABILIZATIO

To gain functional knowledge of a target protein, it is elemental to inhibit aggregation processes. This is especially important for membrane proteins, showing very distinct surface features due to their location in lipidic membranes. For this purpose Cube Biotech provides a large variety of nanodisc products and ultrapure detergents. This makes it easy to find the perfect fit for your project.

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Image is made by Jorik Waeterschoot
of KU Leuven

MSP Nanodiscs

Membrane Scaffold Proteins

Membrane scaffold proteins (MSPs) are typically used for the reconstitution of already isolated and solubilized membrane proteins. They have a hydrophobic and a hydrophilic side. Their native function is transporting cholesterol through the blood.

A variety of MSPs is available that can be assembled to nanodiscs suitable to a wide range of target proteins.

MSPs form nanodisc structures in combination with phospholipids to stabilize membrane proteins.

Cube Biotech offers a pick and choose system so that you can order the MSP nanodisc that suits your research best. You can order the MSP nanodisc components pre-assembled, for cell free expressed membrane proteins or choose nanodisc assembly kits for otherwise expressed membrane proteins.

Size

The size of a MSP nanodisc depends on the membrane scaffolding protein used. Choosing the right size makes it more likely that only one oligomerization state is associated with each disc. Available options:

MSP1D1 Δ H5 Scaffolding Diameter 7-8 nm	MSP1D1 Scaffolding Diameter 9-10 nm	MSPE3D1 Scaffolding Diameter 12-14 nm	MSP2N2 Scaffolding Diameter ~17 nm

Species

Immunization assays require knowledge of the utilized belt protein´s origin so that antibodies directed against the belt protein can be avoided. Each of our MSPs can be purchased from one of four backgrounds:

Human	Mouse	Rat	Alpaca

Tags

The nanodisc assembly kit includes either his-tagged or untagged membrane scaffold proteins. While the pre-assembled nanodiscs have the option to be labled with biotin at their phospholipids.

Nanodisc Assembly Kit		Assembled Nanodiscs	
MSP with His-tag	untagged MSP	Nanodisc Biotin labeled	Nanodisc unlabeled

Lipids

Membrane proteins differ in their preference of phospholipids in their environment. Sometimes screening for protein activity is necessary to determine the correct phospholipids for the nanodisc. Our store includes the most commonly used phospholipids:

POPC	DMPC	DMPG	More on request

Mutations

All MSPs can be purchased in *wt* form or containing a D73C mutation. The additional Cys in the sequence of D73C MSPs can be utilized for functionalization like biotinylation.

Unmutated	D73C MSPs

Synthetic Nanodisc

DIBMA, SMALP & AASTY

Synthetic polymers like DIBMA, SMALP & AASTY can be used to solubilize and stabilize membrane proteins, without the need for detergents.

They cut the membrane protein of interest and some of its native lipid environment out of the cell membrane.

All of our synthetic nanodisc products come as a ready-to-use powder to facilitate screening

DIBMA

PureCube DIBMA is lyophilized from two different buffer solutions (HEPES or TRIS) to ensure a stable pH at 7.5 which is ideal for most protein solubilizations.

Product Range	Article No.	Average Size Distribution	Absorbance at 280 nm	pH, after dissolving	Mg^{2+} Tolerance	Ca^{2+} Tolerance
DIBMA 10 (10x50 mg)	18004 18001	10 kDa	< 0.3 (1 % solution)	7.5	25 mM	starts to precipitate at 50 mM
DIBMA 12 (10x50 mg)	18014 18011	12 kDa				
DIBMA Glycerol (10x50 mg)	18054 18001	10 kDa			>50 mM	>50 mM
DIBMA Glucosamine (10x50 mg)	18044 18041	10 kDa				

SMALP

We add HEPES and NaCl to the SMALP products and freeze-dry them to create a ready-to-use powder that guarantees a stable pH of 7.5 or 8.

Product Range	Article No.	Average Size Distribution	Absorbance	pH, after dissolving	Divalent cationic tolerance	Polymer styrene-to-maleic-anhydride ratio [n:m]
SMALP 140 (10x50 mg)	18220	5 KDa	Absorbs light at 280 nm	7.5	< 5 mM	1.4:1
SMALP 140-I (10x50 mg)	18230	5 kDa			< 100 mM	1.4:1
SMALP 200 (10x50 mg)	18210	6.5 kDa			< 5 mM	2:1
SMALP 300 (10x50 mg)	18200	10 kDa				3:1
SMALP 502-E* (10x50 mg)	18240	7 kDa		8.0	< 4 mM	1.5:1

*This product is not available for US customers.

AASTY

AASTYs are the newest developments for synthetic nanodiscs. The unique feature of AASTY is the defined size achieved by radical polymerization. We deliver our AASTYs as a ready-to-use powder with HEPES buffer at pH 7.5

Product Range	Article No.	Absolute Size Distribution	Absorbance	pH, after dissolving	Divalent cationic tolerance	Acrylic acid to Styrene Ratio [n:m]
AASTY 6-45 (10x50 mg)	18250	5-6 kDa	Absorbs light at 280 nm	7.5	6 mM	45 % to 55 %
AASTY 11-45, (10x50 mg)	18255	10-11 kDa				
AASTY 6-50 (10x50 mg)	18260	5-6 kDa				50 % to 50 %
AASTY 11-50, (10x50 mg)	18265	10-11 kDa				
AASTY 6-55 (10x50 mg)	18270	5-6 kDa				55 % to 45 %
AASTY 11-55 (10x50 mg)	18275	10-11 kDa				

In case you have not worked with your current membrane protein of interest before we compiled our most prominent synthetic nanodisc products into a convenient screening set.

Ultrapure Detergents

Detergents are amphipathic molecules with a polar head and a long hydrophobic carbon chain that form micelles in which membrane proteins can be embedded in order to remain in aqueous solution.

Membrane proteins are in contact with lipidic membranes via large hydrophobic regions. Different detergents can be optimal for extraction, purification, and crystallization steps.

This is why Cube Biotech provides a wide range of ultrapure detergents. All detergents come in aliquots that make them easy to work with and guarantee optimal performance. Bulk quantities are also available.

Schematic image of a membrane protein stabilized with detergents.

> In order to find out which detergent suits your project the best we recommend our screening sets which provide a convenient method to test the detergents.

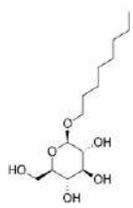
Detergent Class	Detergent Variants Offered (5x1 g)	Article No.
Non-ionic maltosides	Nonylmaltoside (NM) Decylmaltoside (DM) Undecylmaltoside (UDM) Dodecylmaltoside (DDM) Tridecylmaltoside (TDM)	16065 16010 16070 16014 16075
Non-ionic glucosides	Octylglucoside (OG) Octylthioglucoside (OTG) Nonylglucoside (NG) Decylglucoside (DG)	16002 16018 16055 16060
Fos-cholines™	n-Nonyl-phosphocholine (Fos-choline 9) n-Decyl-phosphocholine (Fos-choline 10) n-Undecyl-phosphocholine (Fos-choline 11) n-Dodecyl-phosphocholine (Fos-choline 12) n-Tridecylphosphocholine (Fos-choline 13) n-Tetradecylphosphocholine (Fos-choline 14) n-Hexadecylphosphocholine (Fos-choline 16)	16050 16042 16046 16022 16026 16030 16038
Other lipid-like detergents	N,N-Dimethyldodecylamine N-oxide (LDAO) Cholamidopropyl-dimethylammoniopropane sulfonate (CHAPS)	16006 16080
Detergent screening sets	Detergent Screening Set Classic (1 g each of OG, LDAO, DM, DDM and OTG) Detergent Screening Set 2 (1 g each of NG, NM, UDM, TDM and CHAPS) Detergent Screening Set Phosphocholines 1 (1 g each of Fos-12, Fos-14, and Fos-16)	16092 16094 16093

Crystallization Plates

CubeCrystal Plates combine the benefits of lipidic cubic phase (LCP) and vapor diffusion to push membrane protein crystallization methods to new heights.

The purified protein can be easily dispensed directly into the protein wells as in standard protocols for vapor diffusion. Crystals from 2 - 60 µm in size could be visualized. Because of the UV transparent plastic, a UV detection is also possible to distinguish between protein and salt crystals.

Product	Article No.	Coating	Protein drop volume	Reservoir volume	Material
CubeCrystal 2-well MO Plates	10101	Protein wells are coated with dry mono-olein lipid*	100 nl protein solution + 100 nl reservoir solution	50 µl reservoir solution	Plates made of UV transparent advanced polymer



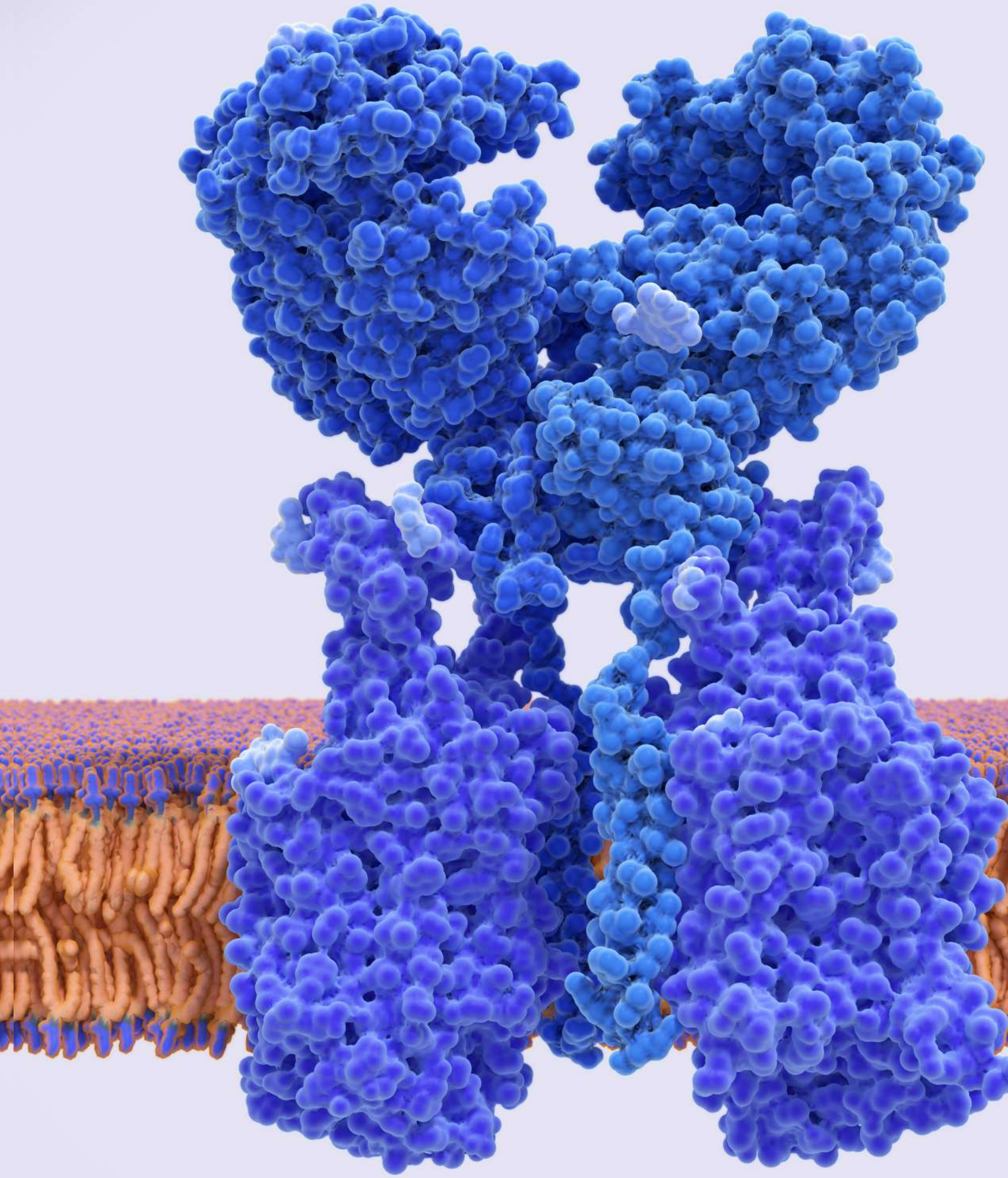
*1-Oleoyl-rac-glycerol can also be purchased separately

The Possibilities of CIMP Technology

- Ready to use, precoated MRC 2-well plates
- Fully automatable on most nanoliter pipetting robots
- Compatible with low protein concentrations (2-5 mg/ml)
- Can be coated with a variety of lipids and lipid mixtures

MEMBRANE PROTEINS

Membrane proteins, in particular GPCRs, are the most pharmaceutically relevant protein class. At the same time, it is very difficult to obtain them in pure, active form. Cube Biotech's protein experts have worked hard to produce high quality human GPCRs and other membrane proteins to offer to the science community.

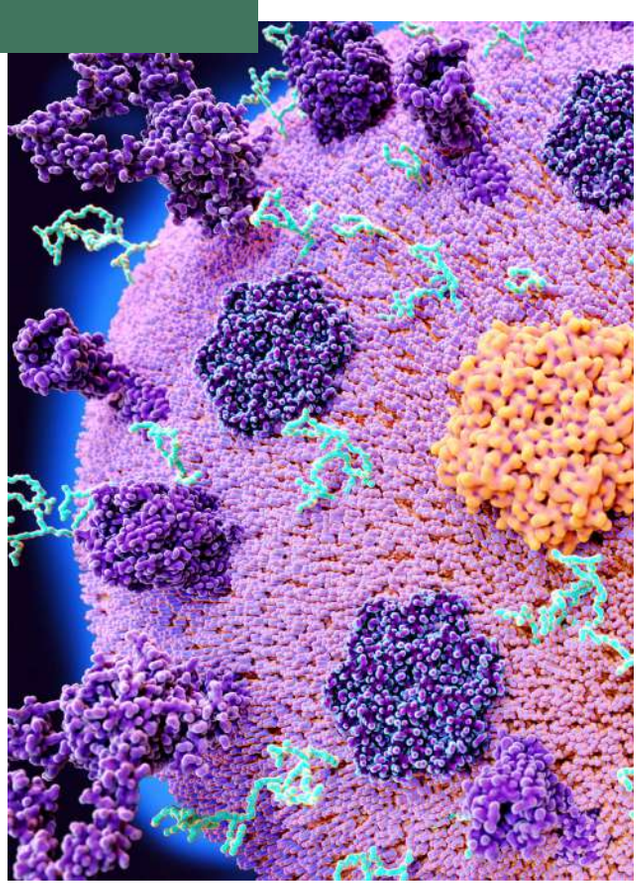


Pure & Active Membrane Proteins

We offer a wide range of pure and active proteins such as, human G-protein coupled receptors, for the use in biochemical or biophysical assays, or as positive controls. Our proteins are available either solubilized in detergent, or reconstituted into nanodiscs for stabilization.

Our mesmerizing membrane proteins come in a wide color range.

> They are ready to use & conveniently aliquoted.



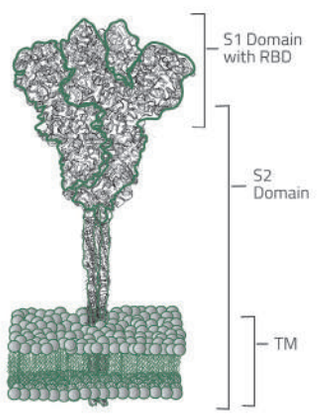
Target Short	Article No.	Target Name	Origin	Form of solubilization/ stabilization
GPBAR1/ TGR5 (10 µg)	28101	G-protein coupled bile receptor 1	Human	Detergent
GLP1R (10 µg)	28201	Glucagon-like peptide receptor 1	Human	Detergent
OPRM1 (20 µg)	29001	Mu-type opioid receptor	Human	Nanodisc
NTSR1 (10 µg)	28301	Neurotensin receptor type 1	Human	Detergent
VGT (10 µg)	28501	Vesicular glutamate transporter 2	Human	Detergent
MC4R (10 µg)	28401	Melanocortin receptor 4	Human	Detergent
HsBR (500 µg)	28903	Bacteriorhodopsin	Halobacterium salinarum	Detergent
HsSR-1 (100 µg)	28911	Sensory rhodopsin-1	Halobacterium salinarum	Detergent
HsSR-2 (100 µg)	28921	Sensory rhodopsin-2	Halobacterium salinarum	Detergent
NpSR-2 (100 µg)	28931	Sensory rhodopsin-2	Natronomonas pharaonis	Detergent
CaChR1 (100 µg)	28941	Channelopsin 1	Chloromonas augustae	Detergent
AChR (40 µg)	28601	Acetylcholin receptor 1	Torpedo Californica	Detergent
Other proteins and bulk quantities on request				

Pure & active Membrane Proteins

SARS-CoV-2

We offer the full-length Spike surface protein of many SARS-CoV-2 mutants in their native trimeric & active state for your research.

Our selection is constantly updated with new mutants of high interest!



Full-length Spike surface protein

Article No.	Mutant Strain of SARS-CoV-2	Spike Available as
28716 28727	Mutant strain B.1.1.7 “Alpha mutant”	Full-length (25 µg) or RBD (100 µg)
28719 28729	Mutant strain B.1.351 “Beta mutant”	Full-length (25 µg) or RBD (100 µg)
28722 28731	Mutant strain P.1 “Gamma mutant”	Full-length (25 µg) or RBD (100 µg)
28744	Mutant strain B.1.617.2 “Delta mutant”	Full-length (25 µg)
28736	Mutant strain B.1.429/ CAL.20C “Epsilon mutant”	Full-length (25 µg)
28733	Mutant strain B.1.525 “Eta”	Full-length (25 µg)
28747	Mutant strain B.1.621 “Mu mutant”	Full-length (25 µg)
28750	Mutant strain B.1.1.529 “Omicron mutant”	Full-length (25 µg)

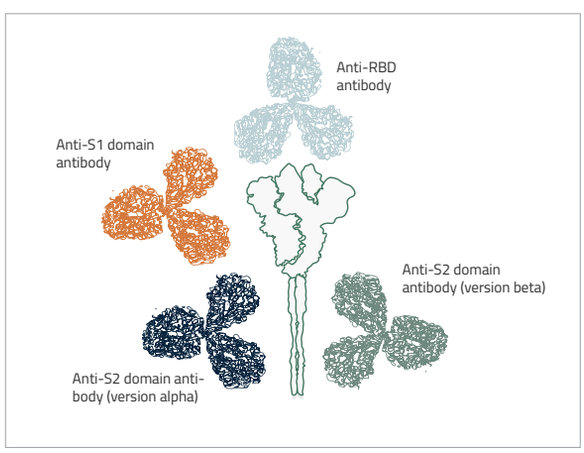
Stabilization Methods for the Spike Protein of SARS-CoV-2		
Spike protein in synthetic nanodisc	Spike protein in MSP1D1 nanodisc	Spike protein in LMNG detergent micelles
 SPIKE in DIBMA Glycerol SPIKE in SMALP 200 SPIKE in SMALP 140		
SPIKE protein set: LMNG detergent (100 µg), DIBMA Glycerol (25 µg) and nanodisc complex (MSP1D1) (25 µg)		

The SARS-CoV-2's involuntary receptor is also available: Angiotensin-converting enzyme 2 (ACE2 receptor Ectodomain), 25 µg, Articel No. 28621

Anti-Spike Antibodies

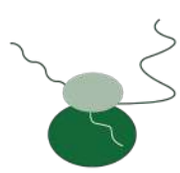
Four different antibodies against various domains of the Spike protein suited for common lab applications like western blots or antigen tests are available.

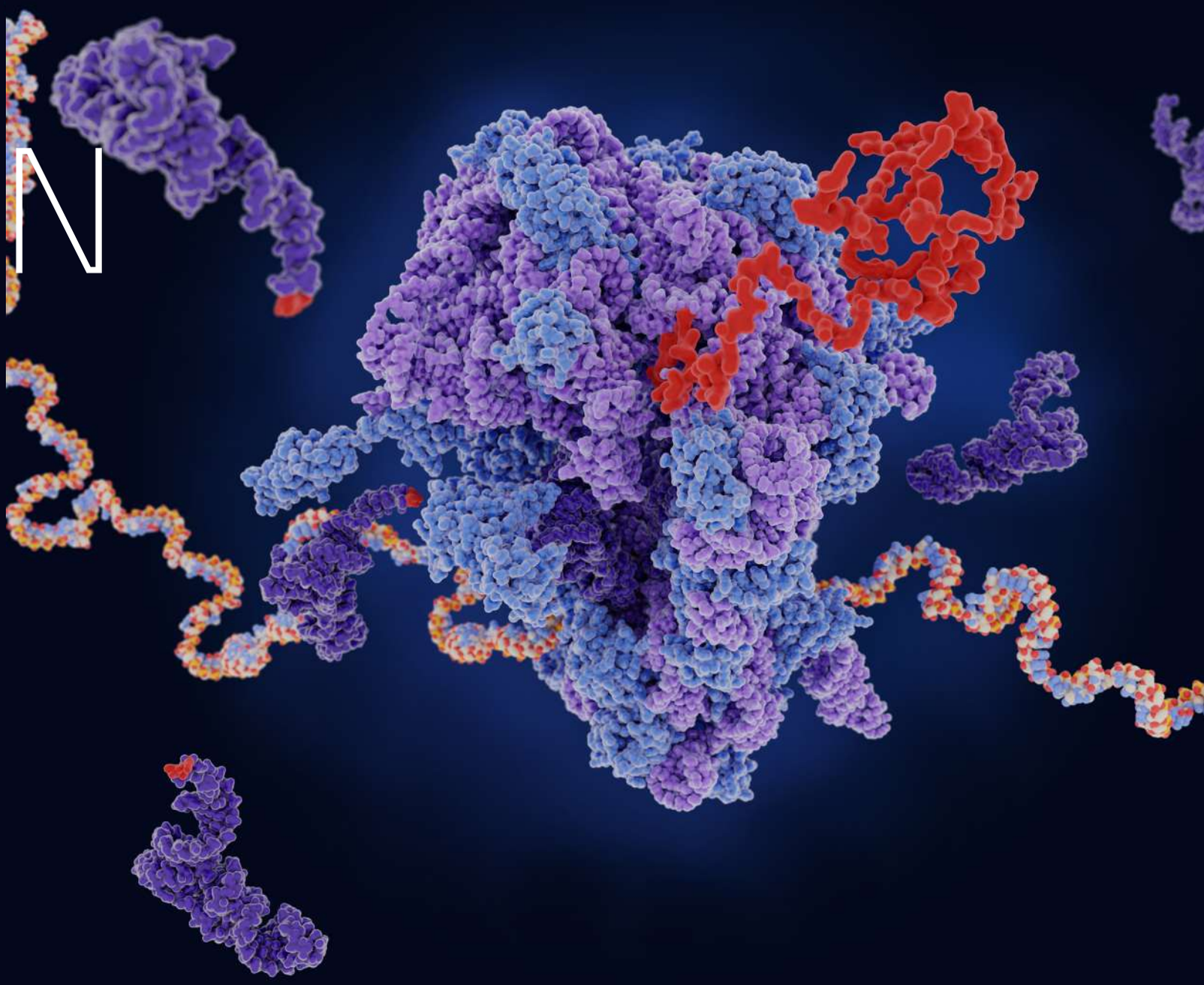
Article No.	Anti-Spike Antibodies
28801	Anti-S1 domain antibody (100 µg)
28803	Anti-S2 α domain antibody (100 µg)
28804	Anti-S2 β domain antibody (100 µg)
28802	Anti-RBD antibody (100 µg)



CELL-FREE EXPRESSIO

Cell-free expression systems provide a production method of target proteins that does not require living cells. They use the lysate of eukaryotic or bacterial cells and the consequent removal of all components not required for protein expression. Thus, the received cell lysates can be managed very precisely.




N

Cell-free Lysates

As an alternative to protein expression in living cells, cell-free lysates can be used to obtain recombinant proteins in vitro.

We provide an open system that can be adapted for a range of applications, with dedicated protocols for membrane proteins, continuous exchange (dialysis) reactions, and much more. This system takes more work initially than ready to use kits, but provides ultimate flexibility in reaction variations.

Properties

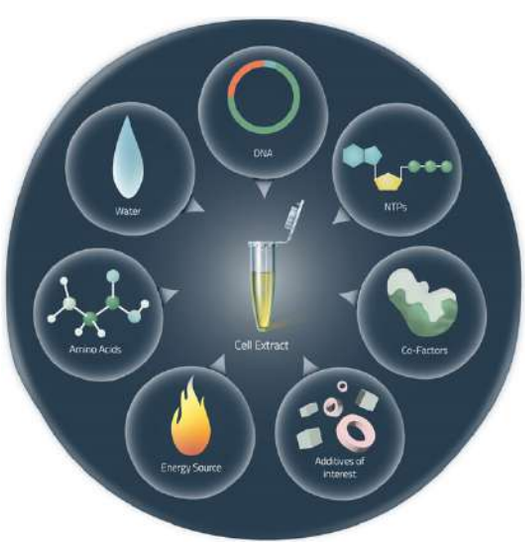
- Open system: add nanodiscs, polymers or detergents to express membrane proteins
- Incorporation of isotopes, fluorescence or biotin labels
- Fast screening of multiple expression constructs
- Heat shock protein-enriched superfolder lysates available
- Provided in collaboration with the Institute of Biophysics at the University of Frankfurt, Germany

Product Range	Article No.	Yields	Optimal Concentrations
Cell-free *E. coli* lysate (350 µl)	21001	1.3-5 mg/ml	16 mM (Mg^{2+})
Cell-free *E. coli* lysate HiYield (350 µl)	21011	1.3-5 mg/ml	16 mM (Mg^{2+})
Cell-free *E. coli* lysate HiYield-T7 (330 µl; includes T7 RNA Polymerase)	21031	up to 6 mg/ml	18 mM

Products contain 1 ml total reaction volume and require additional components.

Applications of Cell-free Expression:

Expression screening, protein labeling, NMR, crystallization/ biophysical, mutagenesis studies, production of toxic proteins



Cell-free expression components and additives
Cell free lysates are managed very precisely. Suitable DNA templates can be combined with components like amino acids, NTPs or certain co-factors to start the in vitro protein expression.

Possible Additives

Detergent: Addition can in many cases aid with a solubilization. An exchange of detergent can be performed in subsequent steps, preferably during purification.

MSP-Nanodiscs: Simple and elegant way to obtain stabilized proteins that can be used for a variety of assays without the need for detergent. Applications range from biophysical assays like SPR, NMR or mass spectrometry to cryo-EM.

Lipid structures: Liposomes, microsomes or lipid-containing structures such as bicelles have been added to cell-free reactions, in particular in combination with insect cell lysates, for membrane protein expression. Subsequent shifts from nanodiscs into bicelles are achieved by appropriate detergents.

PLASTIC & ACCESSORIE

Products of everyday use, columns, plastics and buffers for your laboratory.

Catridges & Batch Spin Columns

They can be filled with your affinity resin of choice.

PureCube Compact Cartridges

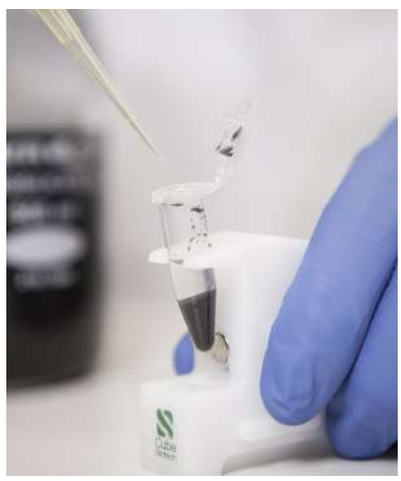
They can be filled with the affinity resin of your choice.
Made from robust materials, the body and end plugs are resistant to most commonly used reagents. The void volume in each end plug is minimal because the fluid is introduced through a narrow flow path. Recommended operational pressure is up to 3 bar (42 psi). PureCube Compact Cartridges are compatible with common chromatography systems like Äkta and Bio-Rad devices.

Empty Cartridges	Article No.	Bed Volume	Diameter x Length (mm)	Body Material	Inlet & Outlet
PureCube Compact Cartridge 1 ml	16912	1 ml	8 x 35	Polypropylene	10-32 UNF female thread
PureCube Compact Cartridge 5 ml	16918	5 ml	17 x 35	Polypropylene	

The Cube MagBead Separator

Every purification protocol that involves magnetic beads does eventually lead to a separation step. Thus, a good MagBead separator (Article No. 16941) is essential!

1. Uses magnets above average in strength.
This is critical because weak magnets can leave either magnetic beads in the solution or worse, they are accidently removed with the supernatant.
2. Comes in a modular setup to save space.
One of these modules can hold up to two 1.5 or 2 ml micro-centrifuge tubes at the same time, while only covering an area of ~3 cm^2. If a larger magnetic bead rack is required you can easily stick the individual modules together.
3. Has a hold for the caps of the micro-centrifuge tubes.
This ensures that one hand can always stay free.



Batch Spin Columns

They can be filled with your affinity resin of choice, and allow for binding, washing, and elution in one single spin column. Designed for small to mid-scale protein purification, the PureCube 1-step batch spin columns save time and pipetting steps. Featuring SelfSeal membrane technology, the column retains resin and sample in a chamber for batch incubation. By centrifugation, the membrane pores dilate and the filtered eluate gathers in the collection chamber of the column.

Columns	Article No.	Max. Volume	Max. g Force	Min. g Force	Filter Pore Size	Body Material
PureCube 1-Step Batch Mini	63104	600 µL	12,000-14,000 x g (45-degree fixed angle rotor)	2,500 x g for 1 min	Polypro-pylene	0.1- 0.2 µm low binding PVDF
PureCube 1-Step Batch Midi Plus	63203	20 ml	1,500-2,000 x g (swing-bucket rotor)	100-200 x g for 1-10 min		

Our R&D and production site is located in Monheim, Germany. We serve academic, pharma and biotech customers in many countries from our headquarters, our US subsidiary or via local distributors. As a small company, we are able to provide small and bulk volumes, customized products and product development services.

Being a young and dynamic team, we are eager to open up new fields of research, to grow as scientists and as people, and to provide you with the highest quality of products. A great passion for the life sciences and the opportunities they hold, is what binds us together.

Be a part of this idea and perform your research with quality products from Cube Biotech, because proteins are our passion.

Dr. Roland Fabis

Managing Director; Operations, Custom product development, Logistics

Dr. Roland Fabis holds a PhD in inorganic chemistry from the University of Muenster, where he worked on silicon-organic compounds, surface modification with silanes, and applications of these substances. Dr. Fabis joined Qiagen in 1995 to work in various positions in basic research, product development, and technology transfer, especially in the fields of magnetic particle synthesis and protein purification.

"A great passion for the life sciences and the opportunities they hold, is what binds us together."

Dr. Jan Kubicek

Managing Director; Business Development, Laboratory management, Quality Control.

Dr. Jan Kubicek holds a PhD in biology from the University of Duesseldorf/ Helmholtz Research Center Juelich. He continued his work on the crystallization of membrane proteins as a post-doctoral fellow in Juelich. In 2006, he joined Qiagen where he was responsible for product development of recombinant protein expression, purification, and crystallization products. In cooperation with Prof. Joerg Labahn (CSSB at the DESY in Hamburg), he developed the Controlled in Meso Phase Crystallization (CIMP) method for the crystallization of membrane proteins.

Dr. Barbara Maertens

Managing Director; Service agreements, Sales, Human resources

Dr. Barbara Maertens studied biology and received her Ph.D. in biochemistry from the University of Cologne where she worked on the biochemical analysis of protein interactions. In 2008, she joined the research and development department at Qiagen and was responsible for protein-related product development. Subsequently, she gained knowledge in setting up protein production workflows according to GMP guidelines in the bioproduction department at Qiagen.

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