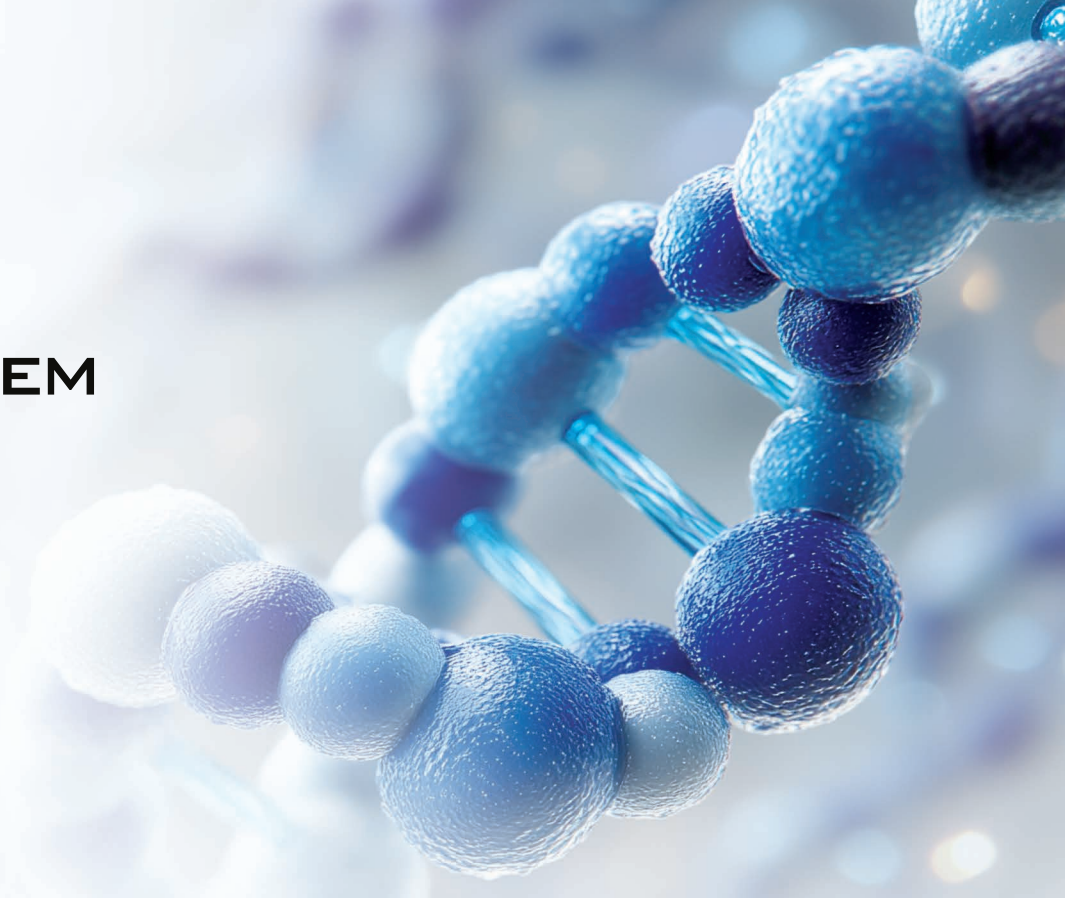
ASYMCHEM



# DRUG DELIVERY MATERIALS




www.asymchem.com

Stock Code:002821.SZ / 6821.HK

# Drug Delivery Materials

## Service

- LIPIDs of Lipid Nanoparticles for mRNA / siRNA / DNA, Liposome Vectorization, Lipid Prodrugs
- POLYMERs for Controlled-release, Pro-drugs, Medical Devices
- GALNAC DERIVATIVEs for Oligonucleotide Delivery
- CARBOHYDRATEs for ADC Conjugates, Vaccine Antigens, Adjuvants

## Capability & Capacity

- 80+ Experienced Process, purification and analytical chemists
- 40+ IND & 7 NDA Experiences (4 Lipids, 2 Polymers and 1 Carbohydrate)
- 3-4 Months to Deliver IND Projects; 8-10 Months to Deliver NDA Projects
- 2 Sites for Manufacturing of Clinical Phases and Commercial Projects

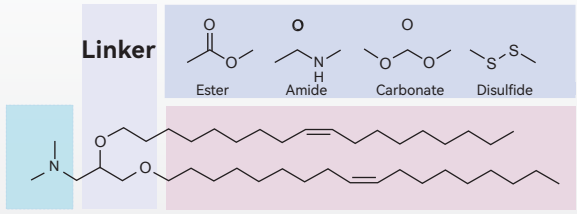
## Technology

- Chemo and Chemo-enzymatic Synthesis for Carbohydrates
- Platform for Synthesizing Well-Defined Polymers
- Flow Chemistry for High-Risk Process Mitigation
- Normal / Reverse / Size Exclusion / Ion Exchange Chromatography Purification
- TFF & Nanofiltration Purification Technologies
- Lyophilization and Spray Drying Separation Technologies

## Lipids

- Cationic & Ionizable Lipids
- PEG-lipids
- Phospholipids

Cationic Lipid




**Head Group**

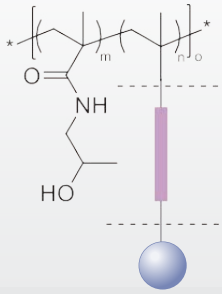
Imidazole
Quaternary Ammonium
Tertiary Amine
Secondary Amine

**Hydrophobic Tail**

Degradable Tails
Saturated Hydrocarbon Tails
Unsaturated Hydrocarbon Tails
Cholesterol Derived Tails

## Polymers

- Drug Conjugated Polymers
- Dendrimers
- Innovative Novel Polymers



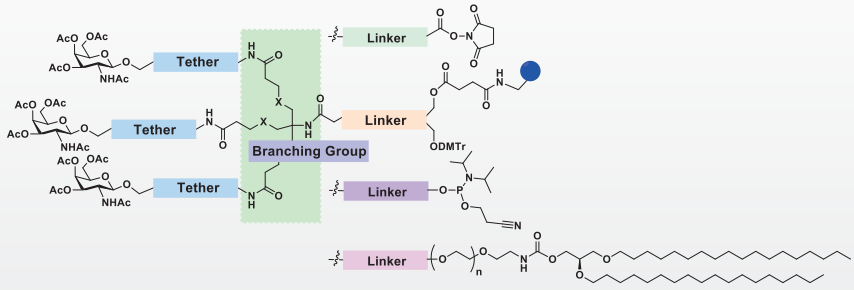
**Polymer Carrier** (PHMPA, PEG, Polyglutamic Acid)

**Linker** (Peptide, Ester, Imine, Amide)

**Drug** (Protein, Small Molecule Drug)

## GalNAc Derivatives

- GalNAc-Solid Support (PS / CPG)
- GalNAc-Phosphoramidites
- GalNAc-PEG-Lipids




**Ligand**

**Tether**

PEG
Alkyl
Amide
Hybrid

**Branching Group**

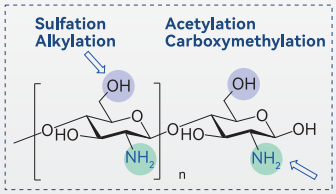
Tris
Dipeptide
Triacid
Serinol

**Linker**

Activated ester
Solid support(PS resin, CPG)
Phosphoramidite

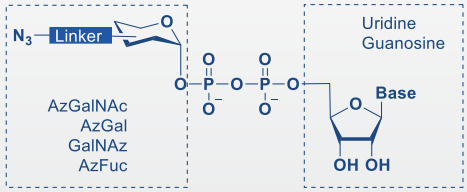
## Oligo / Polysaccharides

**Natural Polysaccharides Modification**



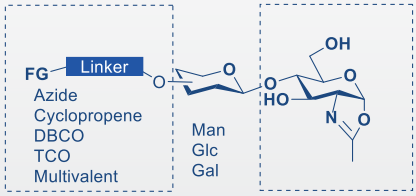

Cyclodextrin Dextrin Chitosan Hyaluronic

**Nucleotide Sugars**




Sugar Diphosphate Nucleotide

**Sugar Oxazolines**



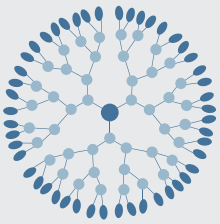

Functional groups Sugar Oxazolines

## Extensive Drug Delivery Materials



### Synthesis of Lipids

- LNP for mRNA/siRNA/DNA
- Liposome Vectorization
- Lipid Prodrug



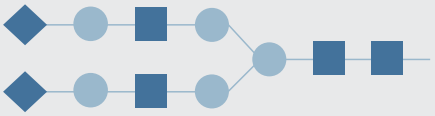
### Synthesis of Polymers

- Drug Delivery/Targeting
- Controlled Drug Release
- Medical Device



### Synthesis of GalNAc Derivatives

- siRNA/ASO Drug Delivery
- Gene Therapy
- Small Molecule Drugs Delivery



### Synthesis of Carbohydrates

- Vaccine Adjuvant and Antigen
- Site-Specific ADC/APC Conjugation Glycosyl Donors
- Cell Therapy

## Services from Preclinical to Commercialization

IND NDA

Discovery | Preclinical | Phase I | Phase II/III | Validation | Commercial

### Research Sample

**100mg~10g**

- Lab Scale Synthesis
- Analytical Method Development
- Synthetic Route Design

### Early Phase

**10g~10Kg**

- Process Development
- Analytical Method Development and Validation
- GLP and GMP Manufacturing
- ICH Stability Study
- IND Filing

### Late phase

**10Kg~100Kg**

- Pre-process Performance Qualification
- Process Validation
- Analytical Method Development and Validation
- ICH Stability Study
- NDA Filing


Reference Standard Characterization
Method Development
Analytical Method Transfer
Method Validation
Analytical Facility and Capacity
Release Testing
Endotoxins Bioburden
Stability Study
Structure Elucidation Physicochemical



# Purification & Isolation Services

## Chromatography Systems

- DAC 150/300/450/600
- GPC 200/450
- IE 200/450

## Membrane Systems

- NF: 1812/2540/8040
- TFF: 1/5/10/30 $m^2$





## Wide range of scales (from grams to multi 100 kgs) and phases (from preclinical to commercial manufacturing)

### Lyophilization

- 1/2/5/10/20 $m^2$
- Total 100 $m^2$

### Spray Drying

- 1~50 L/h
- Total 120 L/h





ASYMCHEM


## CHINA

Asymchem Laboratories (Tianjin) Co., Ltd Headquarters

## USA

ASYMCHEM INC.

## UK

ASYMCHEM LIMITED

## JAPAN

Asymchem Japan K.K.

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