Samyang Advanced Materials

- TRIREX S-Series – Si-PC

Shanghai EP

Aug. 2022

01

polycarbonate-polysiloxane copolymer

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TRIREX S-Series – Si-PC

Features/Benefits

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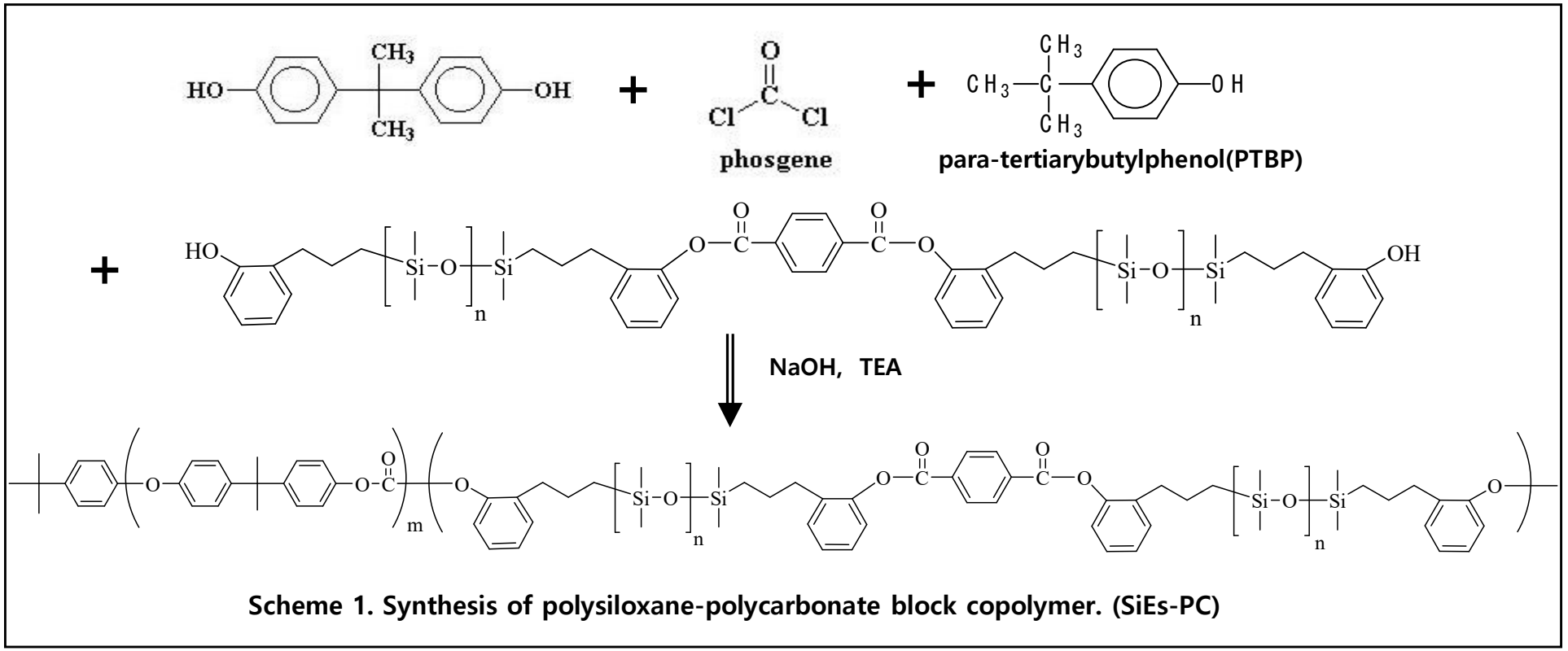
Benefits

01 Low-temp. Ductility + 02 Chemical resistance + 03 Flame Retardancy + 04 Weather resistances + 05 Flow-ability

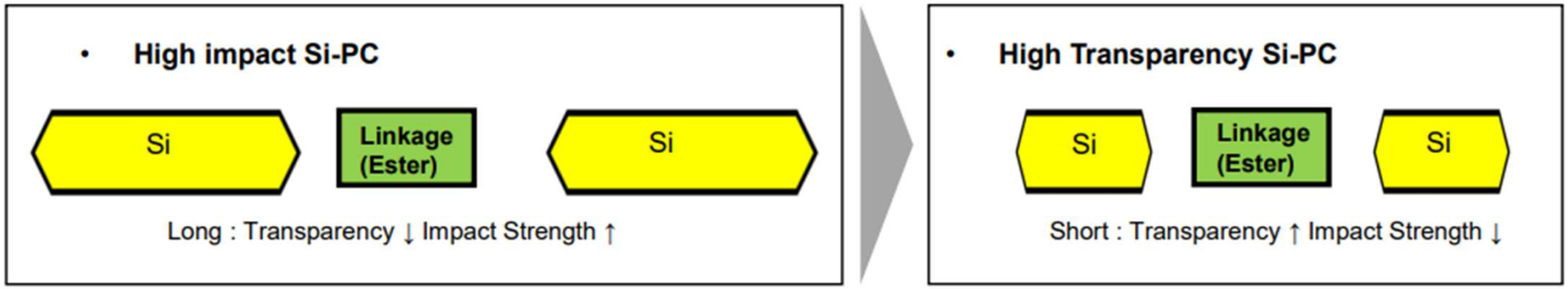
- **Enduring Aesthetics** maintains good looks over the life of the product.
- **Corrosion Proof** will not rust or corrode.
- **Weight-Out** easier to handle and install than metal.
- **ECO-Friendly** needs less-frequent replacement, is recyclable and contains no halogens.
- **Long-Term Durability** products can withstand impact in extreme environments even after extensive weathering.
- **Cost-Out** paint elimination, thinner wall designs and longer-lasting products contribute to cost savings

High-flow grade suitable for thin wall and insert molding

Synthesis of Siloxane Polycarbonate



Scheme 1. Synthesis of polysiloxane-polycarbonate block copolymer. (SiEs-PC)



TRIREX S-Series – Si-PC

Optical and Impact comparison

Characteristics

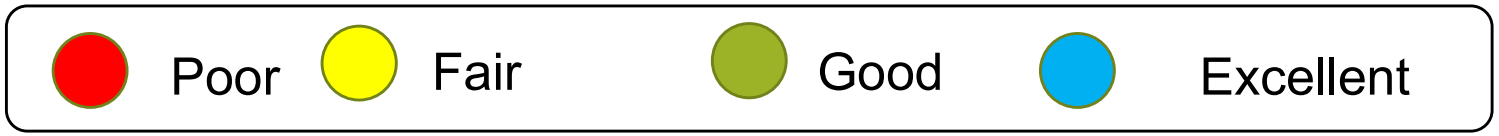
- Low temperature impact resistance
- Good chemical resistance
- High Transparency, Low Haze

Properties

Category	Unit	High Transparency Si-PC	High Impact Si-PC	General PC
Transparency	% (3mm)	85~88	80~85	89
Haze	% (3mm)	3 ↓	9 ↓	0.8
Impact strength	$kg_f cm/cm$ (-30℃)	70	80	15

General PC vs High Impact vs Si-PC

	Gereral PC	PC+Si Impact Agent	Si-PC Compound
Grade	**TRIREX 3020IR**	**TRIREX M3020PN**	**TRIREX SO4-3025UPNV**
Impact Strength at Low Temperature			
Chemical Resistance			
Flame Retardancy			
Weatherability			
Painting			
Price			



TRIREX S-Series – Si-PC

Properties

PROPERTY	UNIT	ASTM METHOD	3022IR	ST6- 3022
PHYSICAL				
Specific Gravity	-	D792	1.200	1.17
Water Absorption (24 hours at 23℃)	%	D570	0.15	0.12~0.15
Mold Shrinkage (3.2mm thickness)	%	D955	0.5~0.7	0.4~0.8
Melt Flow Rate (300℃, 1.2kg)	g/10min	D1238	14	4
MECHANICAL				
Tensile Strength at yield	kg_f/cm^2	D638	680	550
Tensile Elongation at break	%	D638	130	150<
Flexural Strength at yield	kg_f/cm^2	D790	900	800
Flexural Modulus	kg_f/cm^2	D790	21500	17000
Izod Impact Strength, notched, 23℃ (1/8”)	kg_f•cm/cm	D256	80	85
Izod Impact Strength, notched, -30℃ (1/8”)	kg_f•cm/cm	D256	20	75
Izod Impact Strength, notched, -50℃ (1/8”)	kg_f•cm/cm	D256	15	70
THERMAL				
HDT, 18.6 kg_f/cm^2	℃	D648	134	128
HDT, 4.6 kgf/㎠		D648	145	134
OTHERS				
UL-94 Flammability (3.0mm thickness)	-	(UL 94)	V2	V0

TRIREX S-Series – Si-PC

Properties

PROPERTY	UNIT	ASTM METHOD	3022IR	SO4- 3025 UPNV	ST6- 3022
PHYSICAL					
Specific Gravity	-	D792	1.20	1.19	1.17
Water Absorption (24 hours at 23℃)	%	D570	0.15	0.15	0.12~0.15
Mold Shrinkage (3.2mm thickness)	%	D955	0.5~0.7	0.4~0.8	0.4~0.8
Melt Flow Rate (300℃, 1.2kg)	g/10min	D1238	14	7	4
MECHANICAL					
Tensile Strength at yield	kg_f/cm^2	D638	680	590	550
Tensile Elongation at break	%	D638	130	130	150<
Flexural Strength at yield	kg_f/cm^2	D790	900	850	800
Flexural Modulus	kg_f/cm^2	D790	21500	20000	17000
Izod Impact Strength, notched, 23℃ (1/8")	kg_f•cm/cm	D256	80	80	85
Izod Impact Strength, notched, -30℃ (1/8")	kg_f•cm/cm	D256	20	65	75
Izod Impact Strength, notched, -50℃ (1/8")	kg_f•cm/cm	D256	15	45	70
THERMAL					
HDT, 18.6 $kg_f/㎠$	℃	D648	134	126	128
RTI Imp	℃	(UL 746)		115	
OTHERS					
UL-94 Flammability (1.5mm thickness)	-	(UL 94)	-	VO	-
UL-94 Flammability (2.0mm thickness)	-	(UL 94)	-	VO, 5VB	-
UL-94 Flammability (3.0mm thickness)		(UL 94)	V2	VO, 5VA	VO

TRIREX S-Series – Si-PC

UL Approval - SO4-3025UPNV

iq.ul.com

PROSPECTOR®

CLICK TO CONTINUE

View additional material information including performance and processing data

Component - Plastics

E121254

Guide Information

SAMYANG CORPORATION

407 3-Ga Palbok-Dong, Cheonju Cheonbuk 54886 KR

SO4-30(xx)UPN(@)(f1)

Polycarbonate/Siloxane (PC/Siloxane) "TRIREX", furnished as pellets

Color	Min. Thk (mm)	Flame Class	HWI	HAI	RTI Elec	RTI Imp	RTI Str
ALL	0.75	HB	3	0	130	115	130
	1.0	HB	3	0	130	115	130
	1.5	V-0	3	0	130	115	130
	2.0	V-0	3	0	130	115	130
	2.5	V-0, 5VB	2	0	130	115	130
	3.0	V-0, 5VA	2	0	130	115	130

Comparative Tracking Index (CTI): 3

Dielectric Strength (kV/mm): 24.28

High-Voltage Arc Tracking Rate (HVTR): 4

Dimensional Change (%): 0.06

Inclined Plane Tracking (IPT) kV: 1

Volume Resistivity (10^X ohm-cm): 15

Surface Resistivity (10^X ohms/square): -

High Volt, Low Current Arc Resis (D495): 7

(@) - Represents any letter A ~ Z incl., except G with the grade 2(xx)GNH(e).

(f1) - Suitable for outdoor use with respect to exposure to Ultraviolet Light, Water Exposure and Immersion in accordance with UL 746C.

(xx) - Represents any number 00-99 incl. to denote customer code.

ANSI/UL 94 small-scale test data does not pertain to building materials, furnishings and related contents. ANSI/UL 94 small-scale test data is intended solely for determining the flammability of plastic materials used in the components and parts of end-product devices and appliances, where the acceptability of the combination is determined by UL.

Report Date: 2018-08-01

Last Revised: 2021-03-19

TRIREX S-Series – Si-PC

Applications

[Automotive]

[E&E]

[Transparent]

[Others]

- TRIREX S-series resin offers design engineers an outstanding new option for outdoor applications, auto parts, bullet-resistant glass, helmets, smartphone cases, and deliver all the potential benefits you've come to expect from an engineering thermoplastic.

TRIREX S-Series – Si-PC

Applications

BYD

◆ EV charging accessories

Siloxane Copolymer PC [Upper, Lower]

TRIREX FB3025N2 WH, GY

- Flame Retardant Rated (3.0mm V-O)
- UL 746A HWI, Weatherability (UL746C F1)
- Superior Cold Impact, Chemical Resistance

Siloxane Copolymer PC [Charger]

TRIREX SO4-3025UPNV BK

- Flame Retardant Rated (1.5mm V-O, 3.0mm 5VA)
- UL 746B RTI 125℃, Weatherability (UL746C F1)
- Superior Cold Impact, Chemical Resistance

[Lower]

[Upper]

[Charger]

TRIREX S-Series – Si-PC

Applications

ChargePoint

◆ EV charging accessories

Siloxane Copolymer PC

TRIREX SO4-3025UPNV BK, GY, OR

- Flame Retardant Rated (1.5mm V-O, 3.0mm 5VA)
- UL 746B RTI 125℃, Weatherability (UL746C F1)
- Superior Cold Impact, Chemical Resistance

Flame Retardant PC/ABS

TRILOY 210NHF

- Eco-friendly flame retardant
- Flame Retardant Rated (1.0mm V-O, 2.5mm 5VB)
- Good processibility, Dimensional stability

TPE (Thermoplastic Elastomer)

TRIEL 5202SP

- Weatherability, High heat resistance
- Good adhesion property

Flame Retardant PBT Alloy

TRILOY 145N

- Flame Retardant Rated (1.5mm V-O, 3.0mm 5VA)
- Good chemical resistance, UV stability

TRIREX S-Series – Si-PC

Applications

PHILIPS

Siloxane Copolymer PC

TRIREX SO4-3025UPNC

- Flame Retardant Rated (1.5mm V-O, 3.0mm 5VA)
- UL 746B RTI 125℃, Weatherability (UL746C F1)
- Superior Cold Impact, Chemical Resistance
- Improving the flow (a large-area TV)

TRIREX S-Series – Si-PC

Applications

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Dyson

Siloxane Copolymer PC

Dyson Corrale

Dyson Supersonic hairdryer

Characteristics

Excellent transparency and flame retardancy

Excellent chemical resistance

Excellent fluidity (formability)

TRIREX S-Series – Si-PC

Applications

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Mobile

Front

TRIREX SM3-3023V

- Improving the flow (0.65 mm injection molding)
- Flame Retardant Rated (0.8mm HB)
- Superior Cold Impact, Chemical Resistance

Back Cover

TRIREX CP3020G10

- Excellent bond adhesion
- Superior Cold Impact, Chemical Resistance
- Excellent high stiffness and impact resistance

Unibody Rear

TRIREX SM3-3018H

- Emotional materials can be implemented
- Impact resistance

Display 장착 및
모듈부품 장착

TRIREX S-Series – Si-PC

Applications

Others

Siloxane Copolymer PC

TRIREX SO4-3025UPNV

- Flame Retardant Rated (1.5mm V-O, 3.0mm 5VA)
- UL 746B RTI 125℃, Weatherability (UL746C F1)
- Superior Cold Impact, Chemical Resistance


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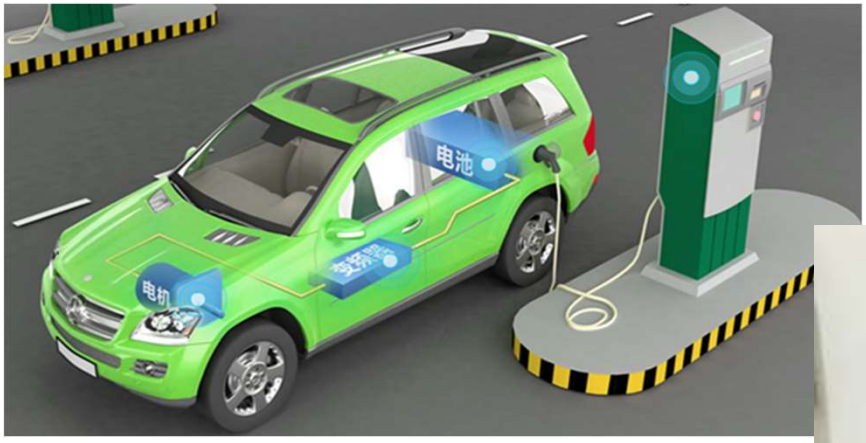
- 1.5mm V-0, 3.0mm 5VA
- 746A CTI 2등급 이상
- 746B RTI 125도
- 746C F1



SiPC (실리콘PC)

Charge Gun

PA66 (나일론)

EV Charger (EVC)

Material solution for EV Infrastructure (SYC)

◆ Battery pack Cover

Flame Retardant PC

TRIREX 3025N2

- Eco-friendly flame retardant
- Flame Retardant Rated (3.2mm V-O)
- UV stability

Flame Retardant PC/ABS

TRILOY 210NHF

- Eco-friendly flame retardant
- Flame Retardant Rated (1.0mm V-O, 2.5mm 5VB)
- Good processibility, Dimensional stability

Flame Retardant PC

TRIREX 3025PN1

- Eco-friendly flame retardant
- Flame Retardant Rated (1.5mm V-O)
- Excellent stiffness

EV Charger (EVC)

Electric Vehicle Charger Market

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Top 20 electric vehicle charging station companies

No.	Company	Application
No.1	ChargePoint	the world's largest network of electric vehicle charging points.
No.2	ABB	charging solutions for fast charging of buses and cars.
No.3	BP	invested in a Chinese EV charging platform provider in China called PowerShare
No.4	Shell	more than 30,000 points across Europe, and access to 50,000 more
No.5	Webasto	provides a mix of home and on-the-road charging solutions.
No.6	Hyundai	develop a wireless electric vehicle charging system
No.7	RWE	company in Europe to manufacture various types of charging stations in-house
No.8	Mercedes-Benz	partnership with RWE, through which own or at least have access to 500 EV station
No.9	Siemens	fast charging solutions as well as extensive technical support.
No.10	EVgo	the largest network of public electric fast-charging stations in the US.
No.11	EVBox	operate the world's largest network of EV charging points (approximately 60,000)
No.12	G2Mobility	develops charging points but is also developing an electric vehicle ecosystem
No.13	Pacific G & E	installing "thousands" of fast-charging stations in the state of California.
No.14	Blink	plans to install another 5,000 by the end of this year.
No.15	Renault	offering an innovative solution it calls "vehicle to grid charging"
No.16	Phihong	information about their new AC32 electric vehicle charger.
No.17	Schneider	significant presence in this nascent market in the future.
No.18	Efacec	encompass "quick charging" to "ultra fast charging"
No.19	Eaton	offering customized solutions to suit the client.
No.20	Ample	plans to use an autonomous, possibly mobile robot to charge the electric car.

[Charge Point]

[BYD]

Material solution for EV Infrastructure (SYC)

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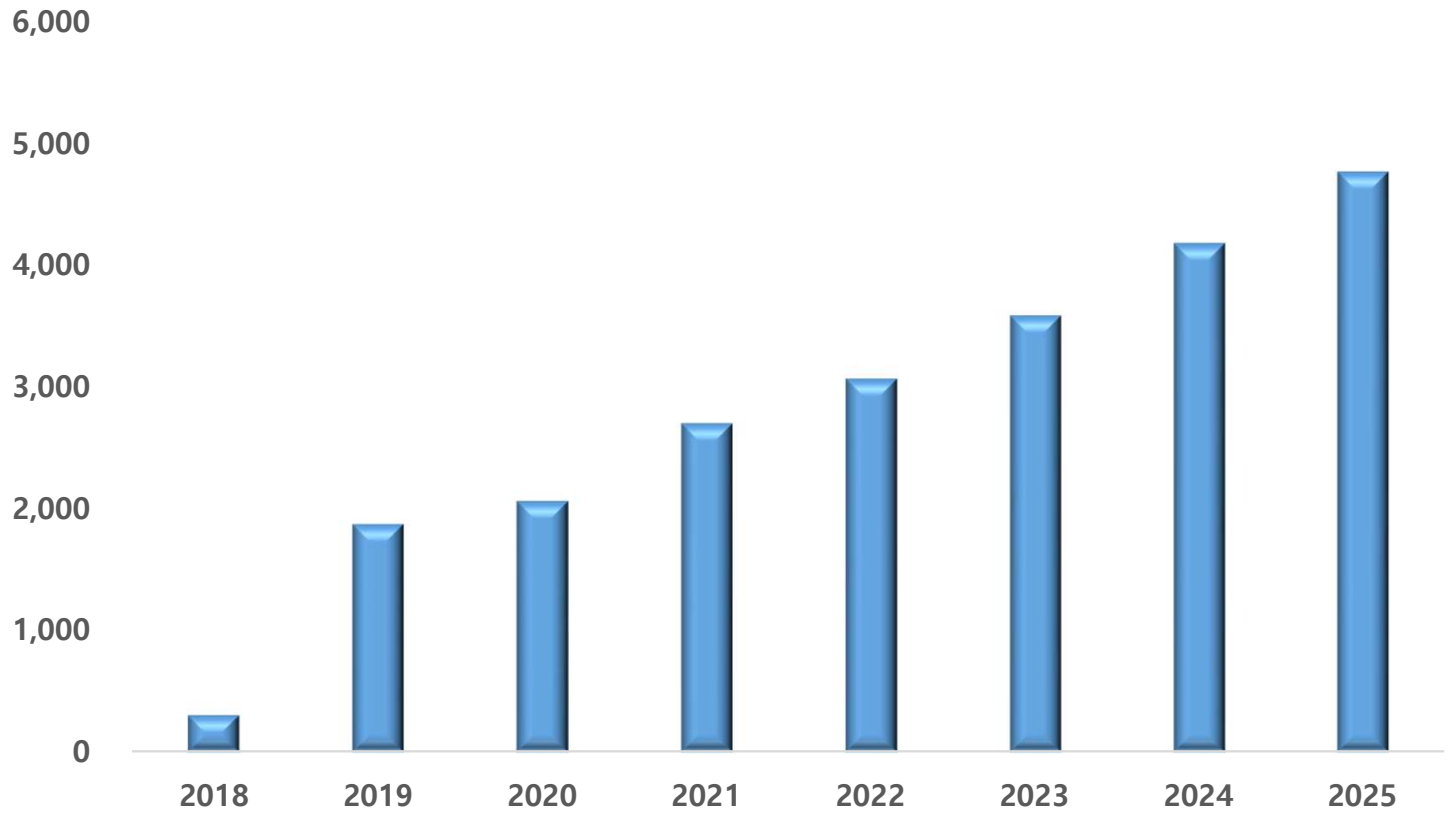
- **Sales growth forecast**



BYD TESLA XPENG RENAULT DFSK 北京汽车 BAIC MOTOR NISSAN