

# Financial Results for 3Q of FYE 3/2018

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Securities code: 4109



# 1. Financial Results for 3Q of FYE 3/2018

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- Basic Financial Data (Consolidated)
- Consolidated Statement of Income
- Non-operating Profit and Loss/Extraordinary Profit and Loss
- Sales Revenue and Operating Profit by Business
- Quarterly Operating Profit
- Consolidated Balance Sheet
- Consolidated Cash Flows, Capital Expenditures, Depreciation & Amortization, Research & Development Expenses

## <Basic Financial Data (Consolidated)>

(In millions of yen)	FYE 3/2018 9M (Apr – Dec)	FYE 3/2017 9M (Apr – Dec)	YoY	
	Actual	Actual	Increase/ Decrease	Percentage Increase/ Decrease
Sales Revenue	25,034	21,887	3,147	14.4
Operating Profit	2,286	3,459	-1,173	-33.9
Ordinary Profit	2,119	3,391	-1,271	-37.5
Quarterly Profit Attributable to Owners of Parent	1,441	2,354	-913	-38.8

(In millions of yen)	Dec.31,2017	FYE 3/2017 End of year	Increase/ Decrease
Total Assets	49,399	52,081	-2,682
Equity Capital	31,312	28,078	3,234
Interest-bearing Liabilities	9,646	13,967	-4,320

## <Consolidated Statement of Income>

	FYE 3/2018 9M (Apr—Dec)	FYE 3/2017 9M (Apr—Dec)	YoY	
			Increase/ Decrease	Percentage Increase/ Decrease
Sales Revenue	25,034	21,887	3,147	14.4
Gross Profit	5,336	6,160	-823	-13.4
Gross Profit Margin (%)	21.3	28.1	-	-
SG&A	3,050	2,700	350	13.0
Operating Profit	2,286	3,459	-1,173	-33.9
Operating Profit Margin (%)	9.1	15.8	-	-
Ordinary Profit	2,119	3,391	-1,271	-37.5
Profit before Income Taxes	1,935	3,295	-1,359	-41.3
Quarterly Profit Attributable to Owners of Parent	1,441	2,354	-913	-38.8

## <Non-operating Profit and Loss/Extraordinary Profit and Loss>

### ■ Non-operating Profit and Loss

(In millions of yen)	FYE 3/2018 9M (Apr—Dec)	FYE 3/2017 9M (Apr—Dec)
<b>Non-operating Profit</b>	<b>236</b>	<b>440</b>
Interest income	6	8
Dividend income	2	2
Share of profit of entities accounted for using equity method	-	22
Gain on valuation of derivatives	159	310
Other	68	97
<b>Non-operating Expenses</b>	<b>403</b>	<b>509</b>
Interest expenses	32	38
Share of loss of entities accounted for using equity method	67	-
Foreign exchange losses	166	351
Other	136	119

### ■ Extraordinary Profit and Loss

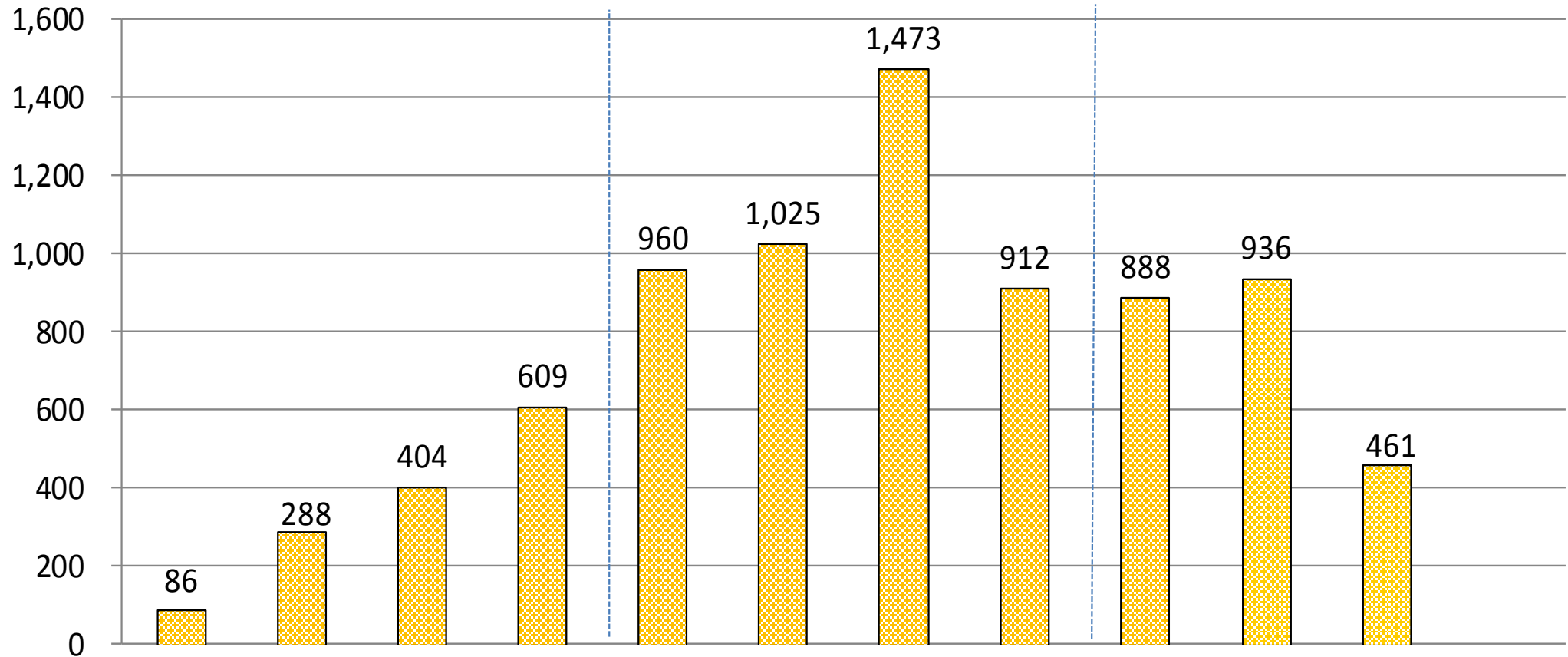
(In millions of yen)	FYE 3/2018 9M (Apr—Dec)	FYE 3/2017 9M (Apr—Dec)
<b>Extraordinary Profit</b>	<b>18</b>	<b>28</b>
Gain on sales of non-current assets	18	28
<b>Extraordinary Losses</b>	<b>203</b>	<b>123</b>
Loss on abandonment of non-current assets	203	46
Loss on sales of non-current assets	0	0
Impairment loss	-	76
Loss on sales of investment securities	-	0

## <Sales Revenue and Operating Profit by Business>

(In millions of yen)		FYE 3/2018 9M (Apr – Dec)		FYE 3/2017 9M (Apr – Dec)		Percentage Increase/ Decrease	
		Sales Revenue	Operating Profit	Sales Revenue	Operating Profit	Sales Revenue	Operating Profit
<b>High-purity Chemical Business</b>		<b>21,693</b>	<b>2,347</b>	<b>18,648</b>	<b>3,460</b>	<b>16.3</b>	<b>-32.2</b>
[High-purity Chemical Business: Breakdown]	Surface Treatment	1,409		1,490		-5.4	
	Alternatives for CFCs	1,855		1,665		11.4	
	Batteries	4,081		3,847		6.1	
	Semiconductors/LCDs	11,375		8,952		27.1	
	Semiconductor Devices	517		349		48.1	
	Catalysts	716		649		10.2	
	Gypsum	62		56		11.9	
	General products	977		1,035		-5.6	
	Other	697		601		16.0	
<b>Transportation Business</b>		<b>3,194</b>	<b>604</b>	<b>3,088</b>	<b>553</b>	<b>3.4</b>	<b>9.2</b>
<b>Medical Business</b>		<b>-</b>	<b>-704</b>	<b>-</b>	<b>-585</b>	<b>-</b>	<b>-</b>
<b>Other Business</b>		<b>146</b>	<b>26</b>	<b>150</b>	<b>20</b>	<b>-2.6</b>	<b>31.7</b>

# <Quarterly Operating Profit>

(In millions of yen)



(In millions of yen)	FYE 3/2016				FYE 3/2017				FYE 3/2018			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Sales Revenue	6,745	7,057	6,789	6,918	7,187	6,757	7,941	7,963	8,159	8,561	8,314	
Operating Profit	86	288	404	609	960	1,025	1,473	912	888	936	461	
Operating Profit Margin	1.3%	4.1%	6.0%	8.8%	13.4%	15.2%	18.6%	11.5%	10.9%	10.9%	5.5%	

## <Consolidated Balance Sheet>

(In millions of yen)	Dec.31,2017	FYE 3/2017 End of Year	Increase/ Decrease
<b>Current Assets</b>	<b>25,985</b>	<b>28,069</b>	-2,084
Cash and Deposits	9,663	14,361	-4,698
Notes and Accounts Receivable - trade	9,251	7,867	1,383
<b>Non-current Assets</b>	<b>23,413</b>	<b>24,011</b>	-597
Property, Plant and Equipment	21,485	22,072	-587
Intangible Assets	139	129	10
Investments and Other Assets	1,788	1,808	-20
<b>Current liabilities</b>	<b>9,979</b>	<b>12,566</b>	-2,586
Short-term Loans Payable	1,950	2,320	-370
Long-term Loans Payable within 1 year	3,009	3,684	-674
<b>Non-current liabilities</b>	<b>6,794</b>	<b>9,998</b>	-3,203
Bonds Payable	-	2,000	-2,000
Long-term Loans Payable	4,686	5,962	-1,275
<b>Net Assets</b>	<b>32,624</b>	<b>29,516</b>	3,107
Shareholders' Equity	30,934	27,771	3,163
<b>Liabilities and Net Assets</b>	<b>49,399</b>	<b>52,081</b>	-2,682



## <Capital Expenditures, Depreciation & Amortization, Research & Development Expenses>

(In millions of yen)	FYE 3/2018 9M (Apr – Dec)	FYE 3/2017 9M (Apr – Dec)
Capital Expenditures	1,987	1,355
Depreciation & Amortization	2,502	2,340
Research & Development Expenses	1,088	960

## 2. Financial Forecast for FYE 3/2018

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- Financial Forecast
- Financial Forecast by Segment

## <Financial Forecast>

(In millions of yen)	FYE 3/2018 Revised Full-year forecast ( Feb.9, 2018 )	FYE 3/2018 Revised Full-year forecast ( Aug.8, 2017 )	FYE 3/2017 Full-year results	FYE 3/2016 Full-year results
Sales Revenue	33,400	33,300	29,850	27,509
Operating Profit	2,100	4,700	4,372	1,388
Ordinary Profit	1,900	4,700	4,154	1,044
Net Profit Attributable to Owners of Parent	1,400	3,300	2,824	1,323
Current Net Profit Per Share	110.38	268.20	234.56	110.33
Capital Expenditures	3,000	3,010	2,328	1,302
Depreciation & Amortization	3,350	3,309	3,117	3,525
Research & Development Expenses	1,550	1,613	1,274	1,163

# <Financial Forecast by Segment>

(In millions of yen)	FYE 3/2018 Revised Full-year Forecast ( Feb.9, 2018 )		FYE 3/2018 Revised Full-year Forecast ( Aug.8, 2017 )		FYE 3/2017 Full-year results		FYE 3/2016 Full-year results	
	Sales Revenue	Operating Profit	Sales Revenue	Operating Profit	Sales Revenue	Operating Profit	Sales Revenue	Operating Profit
<b>High-purity Chemical Business</b>	<b>28,960</b>	<b>2,320</b>	<b>29,100</b>	<b>5,030</b>	<b>25,501</b>	<b>4,422</b>	<b>23,087</b>	<b>1,390</b>
[High-purity Chemical Business: Breakdown]	Surface Treatment	1,840	1,720		2,033		2,097	
	Alternatives for CFCs	2,360	3,410		2,463		2,023	
	Batteries	5,270	5,670		5,072		2,989	
	Semiconductors/LCDs	15,670	14,350		12,310		12,224	
	Semiconductor Devices	710	760		527		545	
	Catalysts	910	770		854		846	
	Gypsum	70	110		94		107	
	General products	1,270	1,450		1,342		1,461	
	Other	860	860		803		791	
<b>Transportation Business</b>	<b>4,250</b>	<b>770</b>	<b>4,020</b>	<b>720</b>	<b>4,143</b>	<b>698</b>	<b>4,195</b>	<b>664</b>
<b>Medical Business</b>	<b>-</b>	<b>-1,010</b>	<b>-</b>	<b>-1,080</b>	<b>-</b>	<b>-792</b>	<b>-</b>	<b>-691</b>
<b>Other Business</b>	<b>190</b>	<b>30</b>	<b>180</b>	<b>30</b>	<b>204</b>	<b>30</b>	<b>226</b>	<b>6</b>

## 3. STELLA CHEMIFA CORPORATION

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- Corporate Profile/Sales Office Locations/Plant Locations (as of December 31, 2017)
- List of Affiliated Companies
- Manufacture and Sale of High-purity Chemical Business

## <Corporate Profile/Sales Office Locations/Plant Locations (as of December 31, 2017)>

### ◆ Corporate profile

Corporate name: STELLA CHEMIFA CORPORATION  
 Head Office: Midosuji MTR Building 3F, 3-6-3 Awaji-machi, Chuo-ku, Osaka  
 Founded: February 1916  
 Established: February 1944  
 Capital: 4,829,782,512 yen  
 Representatives: Chairperson, Representative Director: Junko Fukada  
 President, Representative Director: Aki Hashimoto  
 URL: <http://www.stella-chemifa.co.jp/>














### ◆ Sales office

Osaka Sales Department: Midosuji MTR Building 4F, 3-6-3 Awaji-machi,  
 Chuo-ku, Osaka  
 Tokyo Sales Department: Tokyo Tatemono Yaesu Building 2F, 1-4-16 Yaesu,  
 Chuo-ku, Tokyo

### ◆ Factory addresses

Sanpo Factory: 7-227 Kaisan-cho, Sakai-ku, Sakai  
 Izumi Factory: 1-41 Rinkai-cho, Izumiotsu  
 Kitakyushu Factory: 1-1 Kurosakishiroishi, Yahatanishi-ku, Kitakyushu

## <List of Affiliated Companies>

Base	Logo	Corporate Name	Business Segment	Head Office:
At home		Stella Chemifa Corporation	High-purity Chemical Business	Chuo-ku, Osaka
		Blue Express, Inc.	Transportation Business	Sakai-ku, Sakai
		Blue Auto Trust Co., Ltd.	Other Business	Sakai-ku, Sakai
		Stella Pharma Corporation	Medical Business	Chuo-ku, Osaka
Abroad		Stella Chemifa Singapore Pte Ltd.	High-purity Chemical Business	Singapore
		Stella Express (Singapore) Pte Ltd.	Transportation Business	Singapore
		Blue Express (Shanghai) International Trade Inc.	High-purity Chemical Business	China
		Blue Express (Shanghai) International Freight Forwarding Co., Ltd.	Transportation Business	China
		Zhejiang Blue Star Chemical Co., Ltd.	High-purity Chemical Business	China
		FECT Co., Ltd.	High-purity Chemical Business	South Korea
		Quzhou BDX New Chemical Materials Co., Ltd.	High-purity Chemical Business	China

## <Manufacture and Sale of High-purity Chemical Business>

Our products, fluorine compounds, have continued to be used in the manufacturing process of various products.

Segment name	Main product	Applications
Surface treatment	Hydrofluoric acid for industrial use	Used for acid cleaning of stainless steel and for thinning glass substrates for LCDs
Alternatives for CFCs	Anhydrous hydrofluoric acid	Material for chlorofluorocarbon and fluorine resin
Batteries	Lithium hexafluorophosphate	Electrolyte for electrolytic solution of lithium-ion secondary batteries
Semiconductors and LCDs	High-purity hydrofluoric acid	Cleaning solution for silicon wafers and LCDs Solar batteries
	High-purity buffered hydrofluoric acid	
Semiconductor devices	High-purity fluoride (CaF <sub>2</sub> , PbF <sub>2</sub> , MgF <sub>2</sub> , AlF <sub>3</sub> , and others)	Lens material for i-line steppers and cameras
	Potassium fluoride	Auxiliary agent for manufacturing tantalum for tantalum capacitors
General products	Tin fluoride	Quasi-drug



# Semiconductors and LCDs

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- Features of our products
- Results and forecast of world semiconductor market scale by regions
- New business development in growing market
- Maintenance and strengthening of quality edge
- Change in shipping volume of high-purity hydrofluoric acid (semiconductors and LCDs)

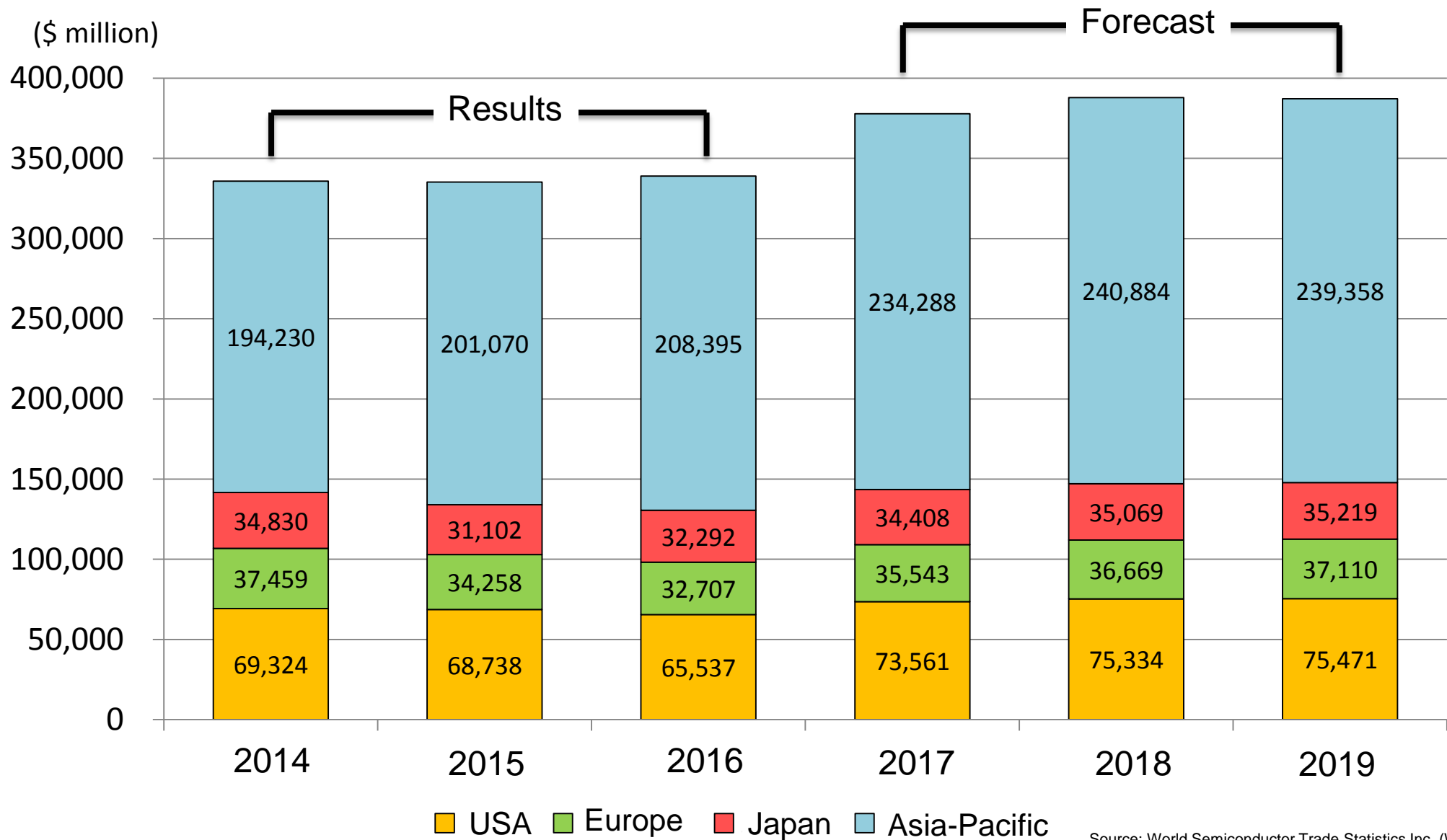
## <Features of our products>

(1) With our ultra purification technology and ultra sensitive technology, we are able to supply the ultra-high-purity hydrofluoric acid and the ultra-high-purity buffered hydrofluoric acid with the best quality in the world.

(2) Product Lineups are readied to respond the customer requirements, including suppression of adhering particles, suppression of increased roughness of wafer surfaces, and others, for the semiconductor and FPD manufacturing process.

Product name (Semiconductor and LCDs)	Description
Ultra-high-purity hydrofluoric acid	The ultra-high-purity chemicals used for wet etching and wet cleaning of silicon wafers in manufacturing semiconductors, FPDs, solar batteries, and MEMS.
Ultra-high-purity buffered hydrofluoric acid	The ultra-high-purity chemical mixed hydrofluoric acid and ammonium fluoride.
BHF (buffered hydrofluoric acid)	The chemical mixed 50% hydrofluoric acid and 40% ammonium fluoride solutions.
LL BHF	BHF with various functionalities by adding a surfactant
LAL BHF	BHF containing a surfactant which has achieved extended service life and other advantages by optimizing the concentration of ammonium fluoride.
LA BHF	BHF which etches silicon oxide at high speed.
HSN Series	Silicon oxide etchant with High Selectivity for silicon nitride.
LPL BHF	Silicon oxide etchant without damaging to silicon and poly-silicon absolutely.

# <Results and forecast of world semiconductor market scale by regions>



Source: World Semiconductor Trade Statistics Inc. (WSTS)

## <New business developments in growing markets>

Manufacturer	Place of construction	Base name	Produced item	Wafer size	Production capacity, etc.	Plan
Toshiba Memory	Yokkaichi	N-Y2	3D-NAND	12 inches	100,000 wafers/month	Production lines will be installed by FY 2017
		Y6	3D-NAND	12 inches		To be completed in summer of FY 2018
Intel	Dalian	Fab 2	3D-NAND	12 inches	80,000 wafers/month	Under construction Equipment will be installed in February 2018
Global Foundries	Chengdu	Fab 11	Foundry	12 inches	20,000 wafers/month	Under construction To go online in late 2018
Micron Technology	Hiroshima	Fab 15	DRAM	12 inches	160,000 wafers/month	A new factory building is under construction for mass production of 1Xnm DRAMs
Samsung Electronics	Xian	17 Line (II)	3D-NAND	12 inches	200,000 wafers/month	Capacity will be increased from 130,000 wafers/month to 200,000 wafers/month in 2019
TSMC	Nanjing		Foundry	12 inches	80,000 wafers/month	Production will start in the second half of 2018
Fujian Electronics & Information; JHICC*Technology licensed by UMC	Quanzhou		Niche DRAM	12 inches	60,000 wafers/month	The factory building is expected to be completed in October 2017 To go online in 1Q 2018
Nexchip (Powerchip)	Hefei		LCD driver IC	12 inches	40,000 wafers/month	Equipment to produce 3,000 wafers/month was installed in April-June 2017 Capacity will be increased by 10,000 wafers/month in 1Q 2018.
Huali; HLMC	Shanghai	Fab 2	Foundry	12 inches	40,000 wafers/month	Equipment will be installed in 2Q 2018
Innotron Memory	Hefei		DRAM	12 inches	125,000 wafers/month	Equipment will be installed in November 2017
Yangtze Memory Technologies; YMTC *Tsinghua Unigroup acquired capital in XMC.	Wuhan		3D-NAND	12 inches	50,000 wafers/month	Equipment will be installed in 2Q 2018 Aiming to increase capacity to 1 million wafers/month by 2030

Large investments in semiconductor factories are in the pipeline for China and other parts of East Asia by 2019.

While the Chinese semiconductor market is currently small, the industry in Taiwan and China is expected to grow increasingly.

**\*We will move ahead by implementing effective sales strategies in the Chinese market.**

# <Maintenance and strengthening of quality edge>

## ◆ SA Grade HF quality ◆

<b>Product technology generation</b>	<b>≥45 nm</b>	<b>28 nm</b>	<b>≤16 nm</b>	
<b>Our product grade</b>	<b>SA/SA-X</b>	<b>SA-XX</b>	<b>SA-XXX</b>	
<b>Metal impurities level</b>	<b>&lt;100 ppt</b>	<b>&lt; 10 ppt</b>	<b>&lt;1 ppt</b>	<u>Succeeded in ultra-high-purity</u>
<b>Management size of particle</b>	<b>0.2/0.1 um</b>	<b>0.05 um</b>	<b>0.03 um</b>	<u>Further strengthening particle management</u>

We respond the needs of semiconductor manufacturers with introducing the World's most advanced analytical instruments.



Liquid-borne particle counter

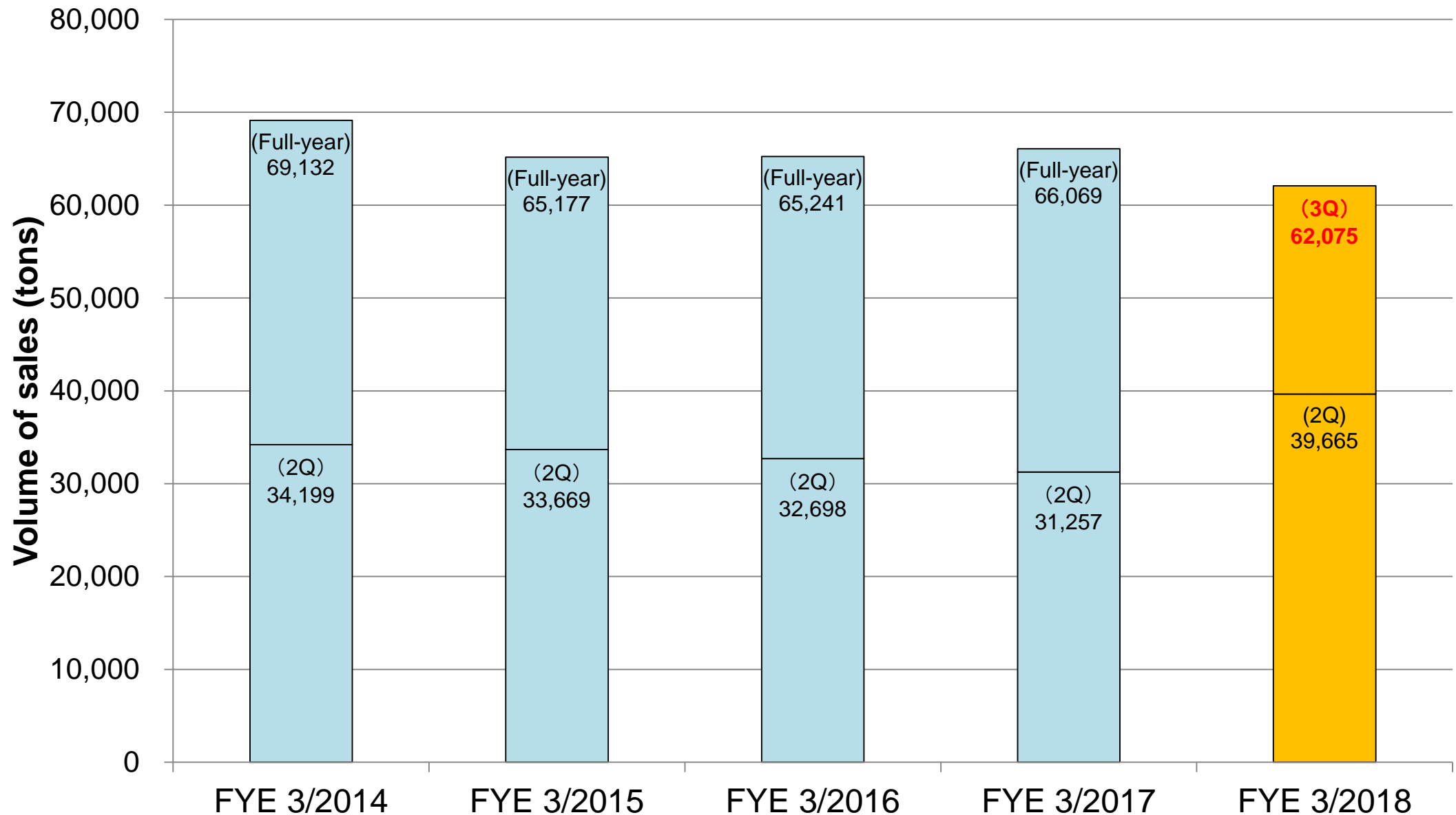
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High resolution ICP-MS

©Thermo Fisher Scientific K. K.

## <Change in shipping volume of high-purity hydrofluoric acid (semiconductors and LCDs)>



# Batteries

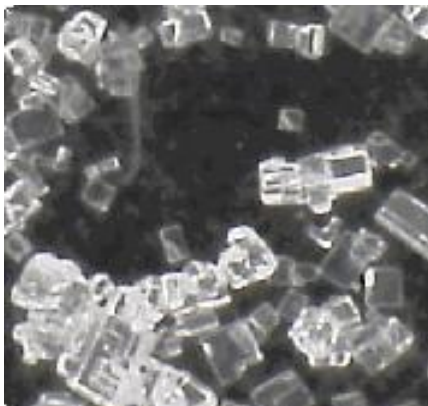
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- Features of our products
- Changes in lithium-ion battery market size and trends in electric-powered vehicles
- Launch of electrolyte business for lithium-ion secondary batteries in China
- Additive for lithium-ion batteries

## <Features of our products>

- (1) Used as main material comprising lithium-ion secondary batteries and commercialized much ahead of other companies
- (2) Because of the product's high purity, it is recently being used for high-performance lithium-ion secondary batteries.

Product name (related to batteries)	Description
Lithium hexafluorophosphate	Electrolyte for lithium-ion secondary batteries Electrolyte for other batteries
Lithium tetra fluoroborate	Electrolyte and additives for lithium-ion primary and secondary batteries
Additive for batteries	Additive for lithium-ion batteries



<Lithium hexafluorophosphate particle form>



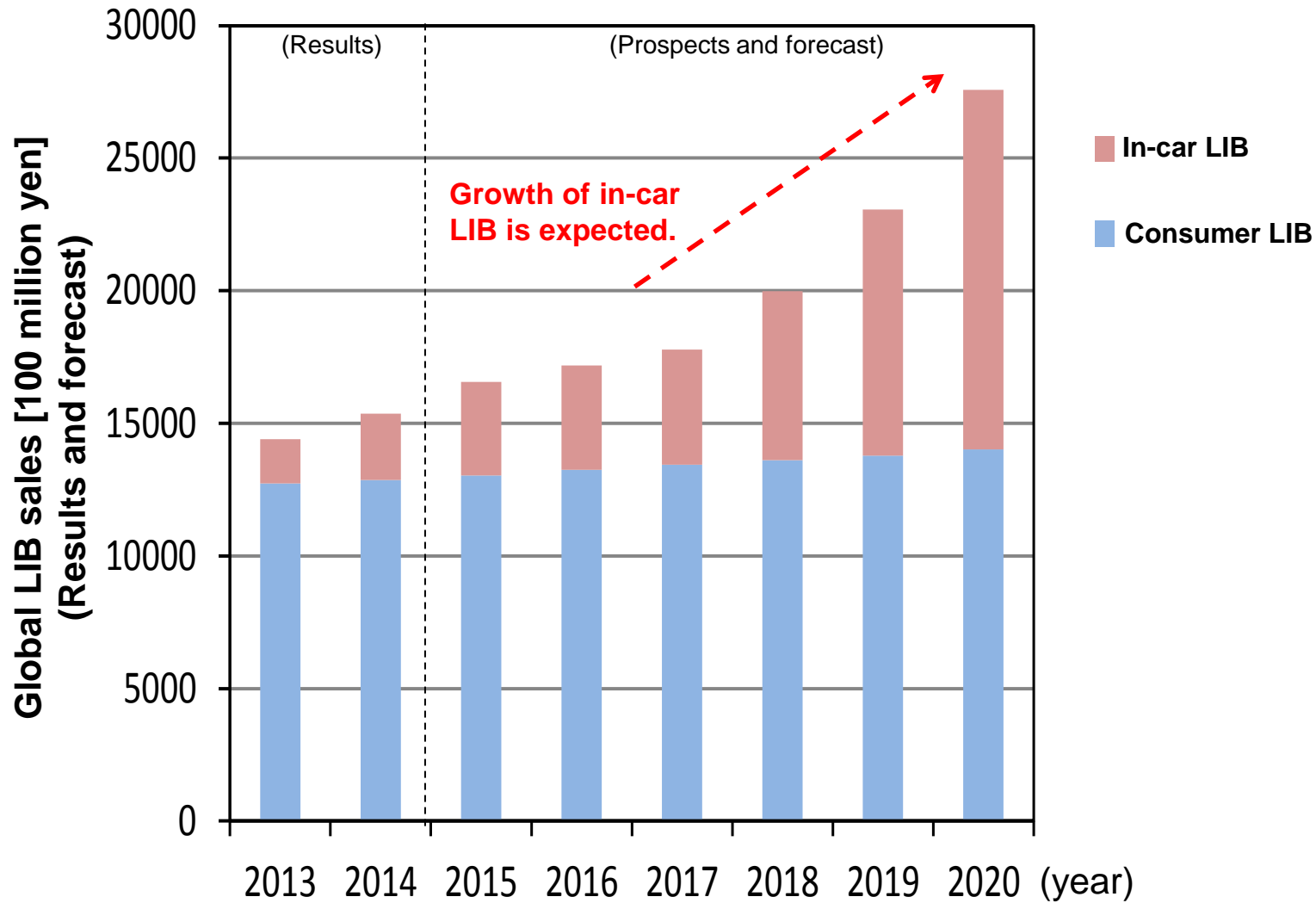
<Lithium tetra fluoroborate>



<Large-size container: 1 m<sup>3</sup>>



# <Changes in lithium-ion battery market size and trends in electric-powered vehicles>



**Growth of in-car LIB is expected.**

**Market rollout of electric-powered vehicles will be accelerated in the years to come.**



Source: Materials of Fuji Chimera Research Institute, Inc.

## <Launch of electrolyte business for lithium-ion secondary batteries in China>

### Outline

\*Converted at the rate of 1 Chinese yuan = 19 yen (as of October 27, 2015)

Name	Quzhou BDX New Chemical Materials Co., Ltd. (established in December 2015)
Location	17 Nianhua Road, Kecheng District, Quzhou City, Zhejiang Province, People's Republic of China
Business lineup	Lithium hexafluorophosphate (LiPF <sub>6</sub> ) Research & development and production of byproduct hydrofluoric acid for industrial use, hydrochloric acid and other fluorine-containing chemical system products Sales of in-house products and provision of related services
Capital fund	70 million Chinese yuan (1,330 million yen*) Stella: 25.0%; Quzhou NGF Chemicals Co., Ltd.: 75.0%
Objectives	In China, continuous growth of lithium-ion secondary battery industry is anticipated. A local production system is established to handle the demand in China.
Details of cooperation	Part of the manufacturing facilities of electrolyte for lithium-ion batteries is relocated to a joint company. The joint company produces the electrolyte for lithium-ion batteries by the relocated facilities and markets the electrolyte in and outside China.



## <Launch of electrolyte business for lithium-ion secondary batteries in China>

### ■ Quzhou BDX New Chemical Materials Co., Ltd.



**Product and material warehouse**



**Manufacturing building**



**Utilities building**

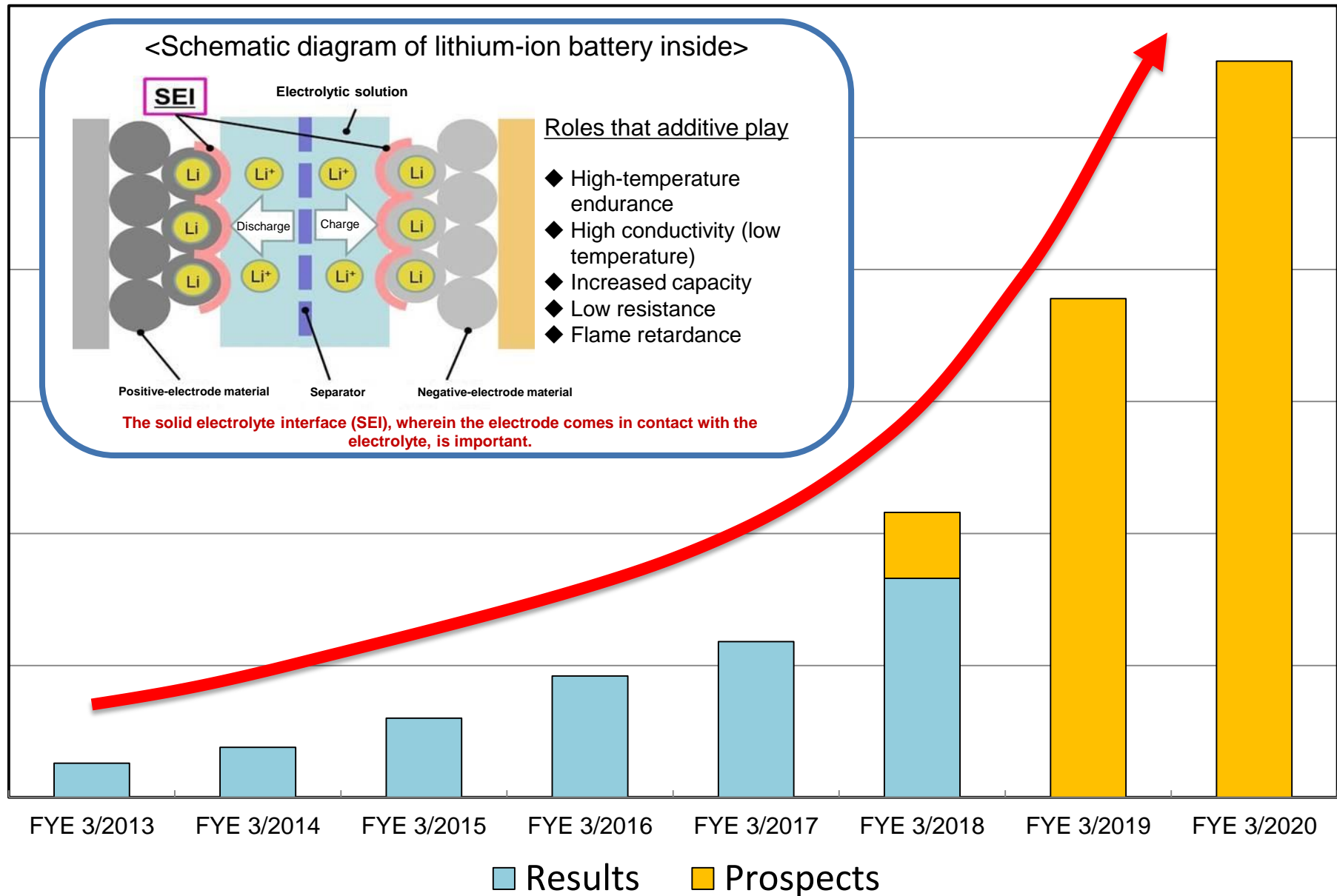
#### <Plan and schedule>

- June 2017  
Start of operation of manufacturing facilities.  
(Manufacturing capacity: 1,300 t/year at maximum)

On completion of product evaluation (including suppliers), sales are slated to be started.



# <Additive for lithium-ion batteries>



# GMP-related

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- GMP(Good Manufacturing Practice)

# <GMP(Good Manufacturing Practice)>

## Standards for Manufacturing Control and Quality Control for Drugs and Quasi-drugs

- Three principles: “Reducing human errors to the lowest level”  
 “Preventing contamination and product quality loss”  
 “Designing systems to assure high product quality”



Inside Izumi Factory (Izumi Otsu City)

# <GMP(Good Manufacturing Practice)>

For manufacturing  
semiconductors



Expanded to products related to  
daily commodities

<Examples of products for drugs>

Tin fluoride

Sodium fluoride

Sodium monofluorophosphate



<Actions of fluorine on teeth>

- To suppress Streptococcus mutans from producing acid (Cavity prevention)
- To promote tooth remineralization
- To form tooth resistance to acid (To form fluoroapatite)



**Sales  
started.**

## 4. Medical Business

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- Corporate Profile (as of December 31, 2017)
- Boron Neutron Capture Therapy (BNCT)
- Establishment of enrichment technology/Features of enriched Boron/Applications of  $^{10}\text{B}$  compounds
- World's First Accelerator-based BNCT Clinical Trial
- Boron-based Drug SPM-011 for BNCT Designated for MHLW Prioritized Review System for innovative medicines "SAKIGAKE"
- Participation in Development of Cancer Diagnosis Technology



## <Corporate Profile (as of December 31, 2017)>

<b>Corporate name:</b>	STELLA PHARMA CORPORATION
<b>Head Office:</b>	3-2-7 Koraibashi, Chuo-ku, Osaka-shi, Osaka
<b>Representatives:</b>	Tomoyuki Asano, Representative Director and President
<b>Established:</b>	June 2007
<b>Business lineup</b>	Research and development, manufacture and marketing, etc. of drugs and medical devices
<b>Capital:</b>	1,900 million yen
<b>Shareholders:</b>	Stella Chemifa Corporation Innovation Network Corporation of Japan Sumitomo Heavy Industries, Ltd.
<b>Laboratory:</b>	Sakai Drug Discovery Research Center (Naka-ku, Sakai-shi, Osaka)
<b>URL</b>	<a href="http://www.stella-pharma.co.jp/">http://www.stella-pharma.co.jp/</a>

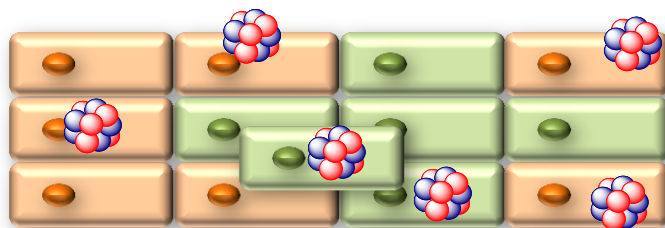


**STELLA PHARMA**

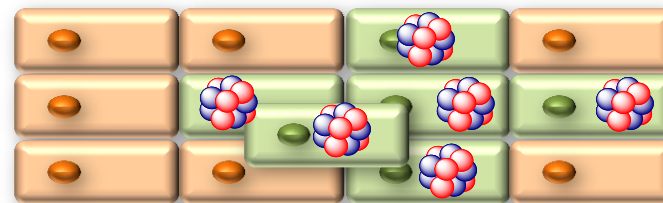
# <Boron Neutron Capture Therapy (BNCT)>

## Boron Neutron Capture Therapy

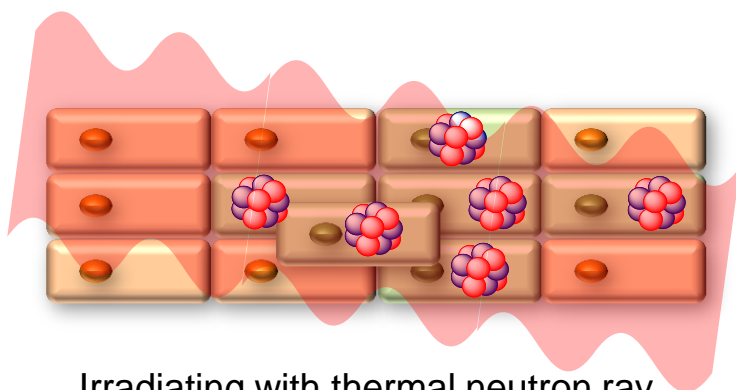
Boron Neutron Capture Therapy (BNCT) is a particle beam radiation therapy which damages cancer cells specifically by making the best of **nuclear fission reactions** between **boron 10**, stable isotope of boron, and **thermal neutrons** using small energy.



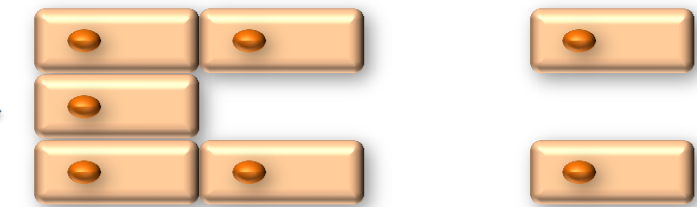
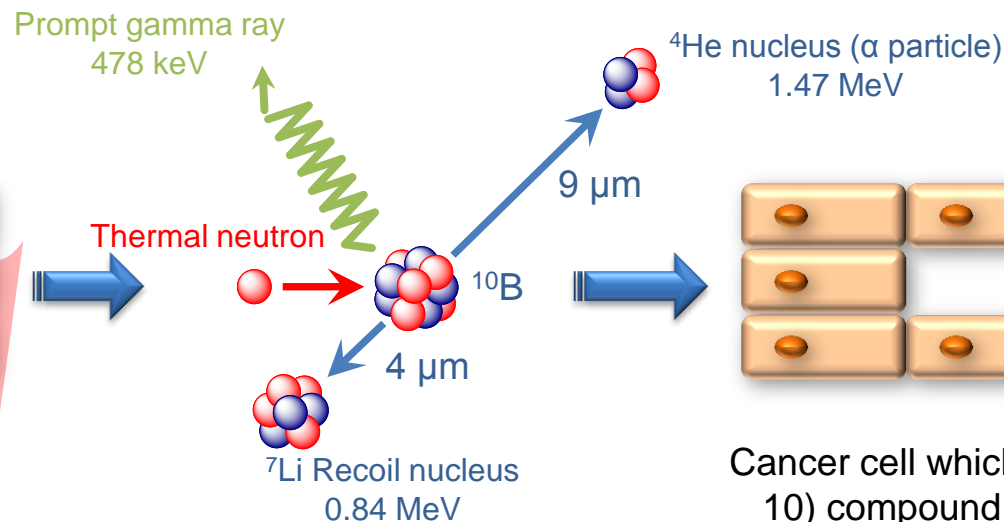
Administration of boron (Boron-10) compound



Boron (Boron-10) compound is selectively brought into cancer cells.



Irradiating with thermal neutron ray causes boron (Boron-10) to fission.



Cancer cell which brought in boron (Boron-10) compound is selectively destroyed.

## ■ Establishment of enrichment technology

We established a mass production technology of  $^{10}\text{B}$  for the first time in Japan and in November 2000, the only enrichment plant in Japan was completed.



<The **only**  $^{10}\text{B}$  enrichment plant in Japan> (completed in November 2000)

## ■ Features of enriched Boron

$^{10}\text{B}$  offers properties of remarkably high neutron absorption capacity, and by increasing  $^{10}\text{B}$  concentration, the absorption capacity is improved significantly.

## ■ Applications of $^{10}\text{B}$ compounds

- Neutron-absorbing material of spent nuclear fuel transportation-and-storage containers
- Material of control rods of nuclear reactors and rack material of spent nuclear fuel pools
- Excess reaction control of pressurized-water reactors by immersing them in primary cooling water
- **Cancer drug for boron neutron capture therapy (BNCT)**

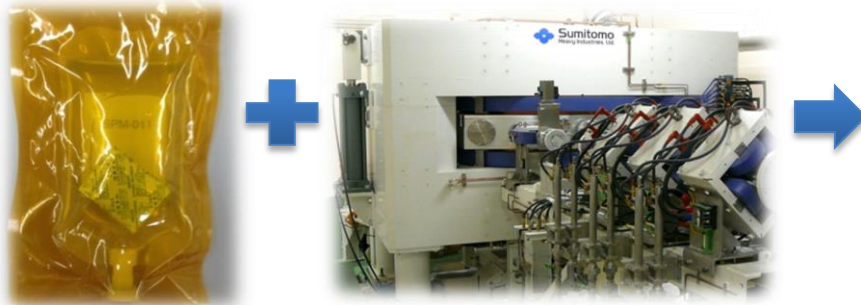
# <World's First Accelerator-based BNCT Clinical Trial>

## Phase II study is going on.

The world's first BNCT clinical trials using the boron-based drug for BNCT (SPM-011), which Stella Pharma developed as well as accelerator-based irradiation system for BNCT, developed by Sumitomo Heavy Industries, "Phase II study for recurrent malignant glioma (high-grade brain tumor)" started in December 2015 and "Phase II study for head and neck cancer" in June 2016. These trials were started after submitting the clinical trial plan notification, and are still ongoing.

Pharmaceutical solution bag made by Stella Pharma

Accelerator-based irradiation system made by Sumitomo Heavy Industries



### World's first BNCT clinical trial

Recurrent malignant glioma (high-grade brain tumor)  
⇒ December 2015, Phase II study started.

Head and neck cancer  
⇒ June 2016, Phase II study started.

### Assumed flow chart, from clinical trial to approval application

Phase I study

Phase II study

Approval application (scheduled)

Neutron dose is increased stepwise to check safety.

Verification of effect by the dose decided.

## <Boron-based Drug SPM-011 for BNCT Designated for MHLW Prioritized Review System for innovative medicines “SAKIGAKE”>

Boron-based drug “SPM-011” for BNCT for which Stella Pharma Corporation performs clinical development was designated by Ministry of Health, Labour, and Welfare (MHLW) for “Prioritized Review System for innovative medicines ‘SAKIGAKE’” On April 21, 2017.

Drug name	Intended indications and effects	Name or trade name of applicant
SPM-011	<ul style="list-style-type: none"> <li>• Recurrent malignant gliomas</li> <li>• Unresectable locally recurrent head and neck cancer and locally-advanced head and neck cancer (non-squamous cell carcinoma)</li> </ul>	Stella Pharma Corporation

The BNCT system (accelerator-based irradiation system) of Sumitomo Heavy Industries, Ltd., which jointly carries out the clinical study was assigned for the target item of the said system as a medical device on February 28, 2017, too.

### “Prioritized Review System for innovative medicines ‘SAKIGAKE’”

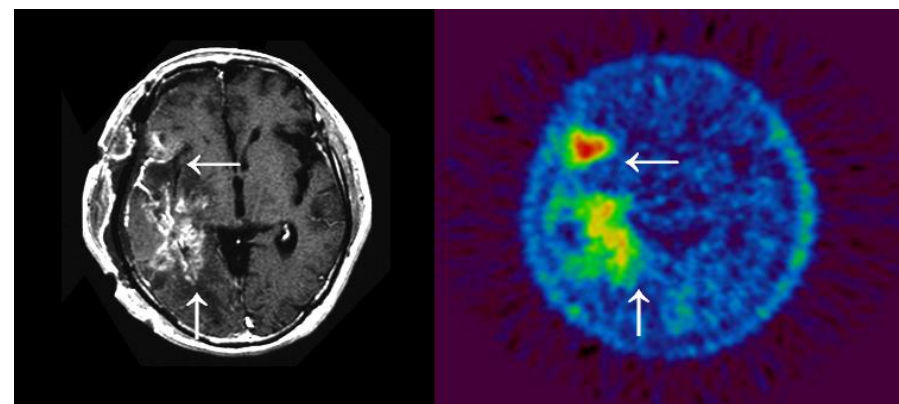
When an innovative new drug or medical device satisfies severity and other specified requirement of applicable diseases, the drug or the medical device which MHLW evaluates and assigns is given priorities in consultation and review process for its approval by using this system, and the target NDA review period can be shortened to six months, one half of that required in ordinal review.

## <Participation in Development of Cancer Diagnostic Technology>

We have undertaken the development of PET diagnostic technology using [ $^{18}\text{F}$ ]FBPA, which attracts researchers and industry attention as a new PET drug used for “PET diagnosis,” which is a technology useful for early detection of cancers.

### Features of PET diagnosis using [ $^{18}\text{F}$ ]FBPA

- ★ To be able to detect “brain tumor,” which is difficult to detect at present.
- ★ Able to simply carry out PET diagnosis by [ $^{18}\text{F}$ ]FBPA for institutes where PET diagnosis is conducted at present.
- ★ To be able to judge whether BNCT can be applied.



(Left) MRI image of brain tumors  
(Right) [ $^{18}\text{F}$ ]FBPA PET image of brain tumors

Signing the joint development agreement with Sumitomo Heavy Industries, Ltd., which has expertise in the automated synthesis of PET drugs, enabled us to develop PET drugs and take a major step forward to commercialization.

Joint research is ongoing with Osaka Prefecture University, Osaka University, the National Cancer Center, and other well-established research organizations through a project adopted by the Japan Agency for Medical Research and Development (AMED).

**In order to provide total medical care from early cancer diagnosis to therapy, we will continue to carry out research and development in coming years.**

# 5. Transportation Business

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- Corporate Profile (as of December 31, 2017)
- Transportation System by Cooperation with Domestic Bases
- Overseas Bases
- International Intermodal Logistics System
- Future Activities

## <Corporate Profile (as of December 31, 2017)>

**Corporate name:** BLUE EXPRESS CORPORATION

**Head Office:** 10 Ohamanishi-machi, Sakai-ku, Sakai-shi

**Representatives:** Kiyonori Saka, Representative Director and President

**Established:** June 1991

**Capital:** 350 million yen

**Business lineup** Common motor trucking / International intermodal transport / Warehousing / Customs clearing agent / sales, rental and lease of containers, tanks, etc. / Automobile maintenance services / Business related to life insurance and non-life insurance agent, etc.

**URL** <http://www.blue-express.co.jp/>





## <Transportation System by Cooperation with Domestic Bases>



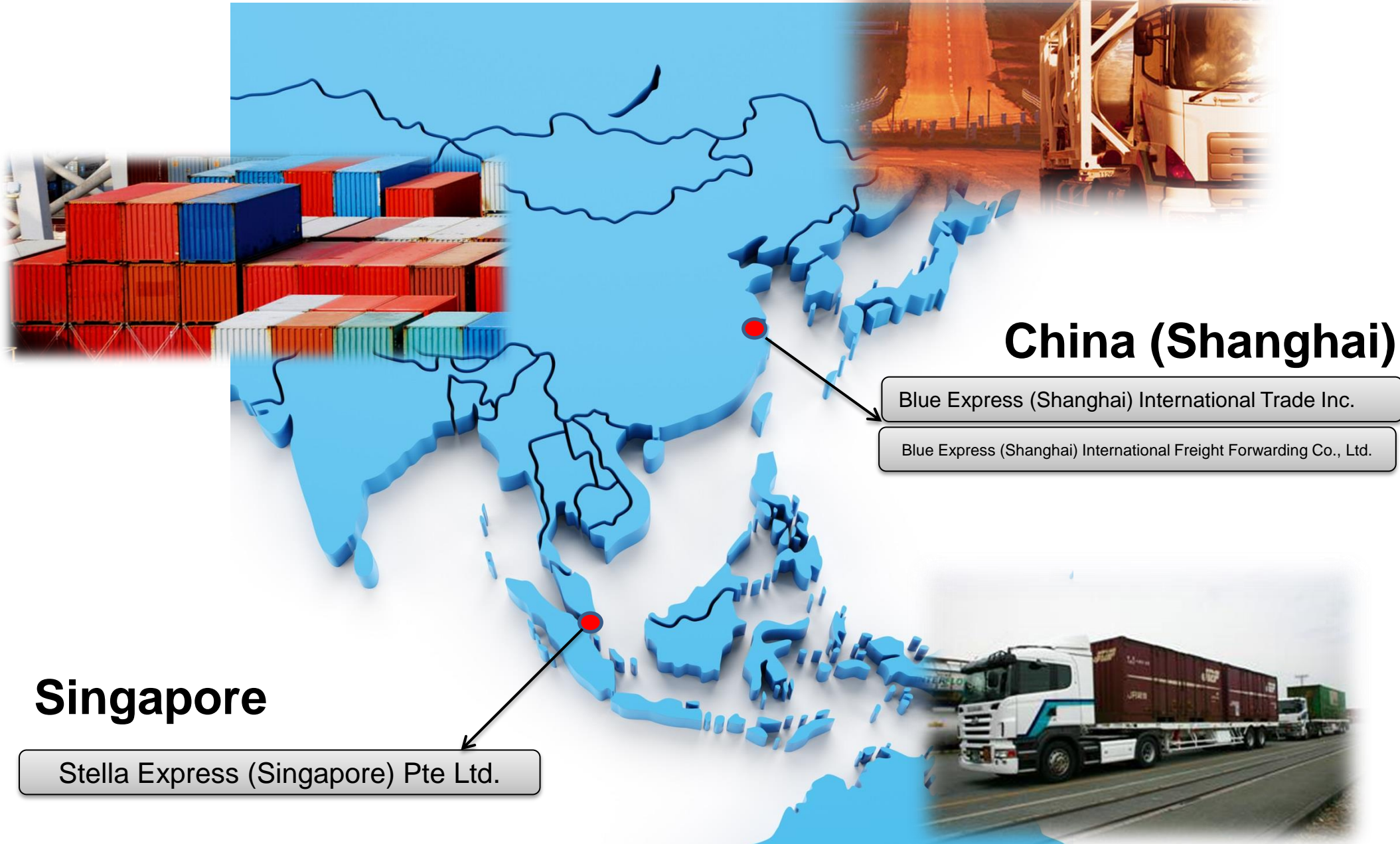
- Shipping terminals
  - Sendai Office
  - Kanto Office
  - Yokohama Office
  - Shimizu Office
  - Nagoya Office
  - Ohama Office
  - Kobe Office
  - Kitakyushu Office

- ★ Customs clearance sites
  - Tokyo Office
  - Yokohama Office
  - Osaka Office
  - Ohama Office

Kitakyushu Office  
Opened in October 2014



## <Overseas Bases>



### China (Shanghai)

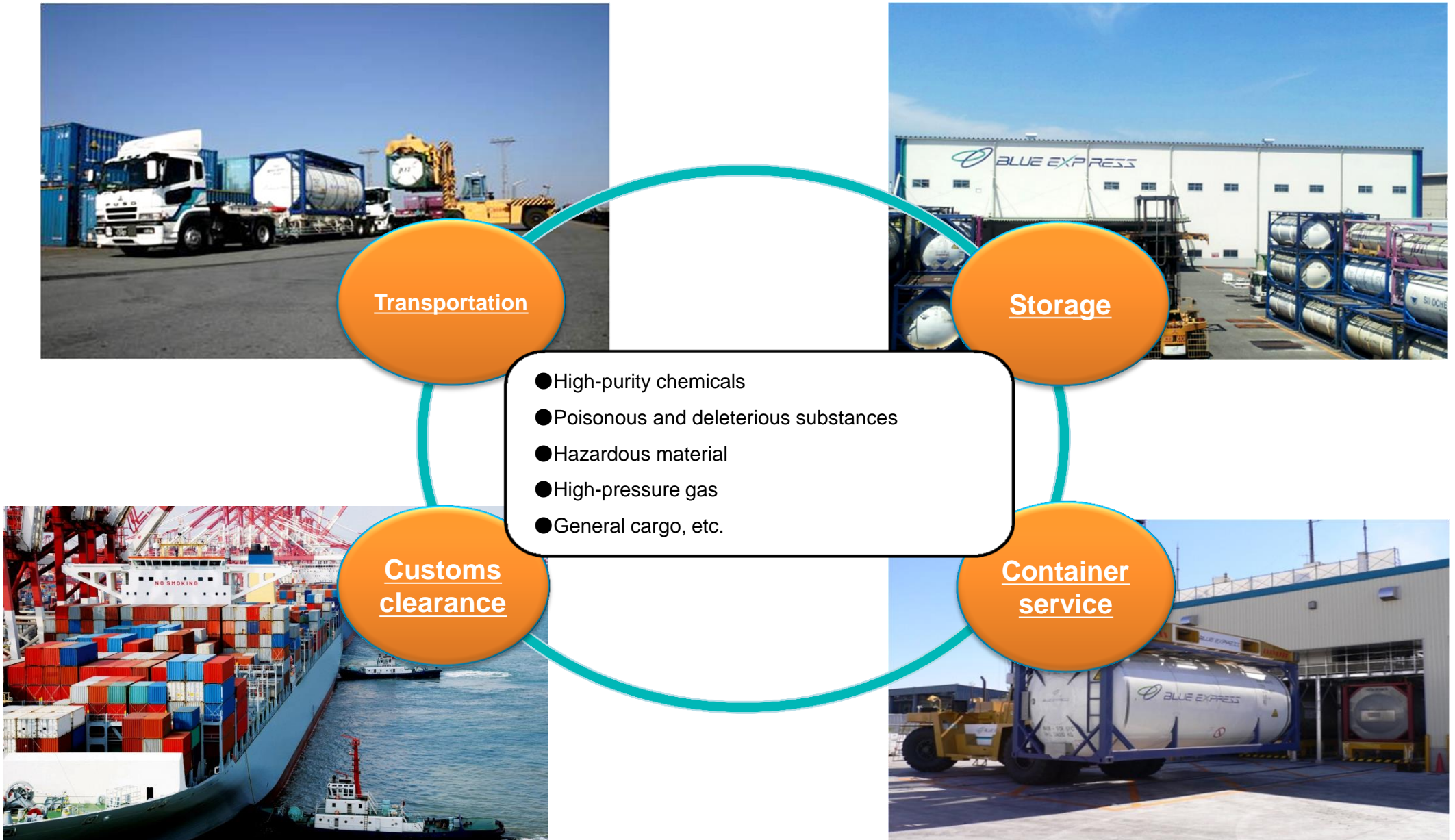
Blue Express (Shanghai) International Trade Inc.

Blue Express (Shanghai) International Freight Forwarding Co., Ltd.

### Singapore

Stella Express (Singapore) Pte Ltd.

# <International Intermodal Logistics system>



## <Future Activities>

- To steadily expand business with priority given to the improvement of customer satisfaction  
 To further improve quality, etc. of international intermodal logistics service
- To maintain continuous investment for further growth  
 To establish the additional hazardous substance warehouse  
 (construction to be started in April 2018)
- To further strengthen business operation base and revenue base  
 To develop compliance system and securing personnel



## 6. Future Activities

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- Approaches to Advanced Energy Devices
- New additive for advanced lithium-ion Batteries
- Electrolyte for Post Lithium-ion Batteries
- Development of Catalysts for Polymer Electrolyte Fuel Cells (PEFCs)
- Fluorinated Carbon Nanotubes
- Fluoride Nanoparticles

# <Approaches to Advanced Energy Devices>

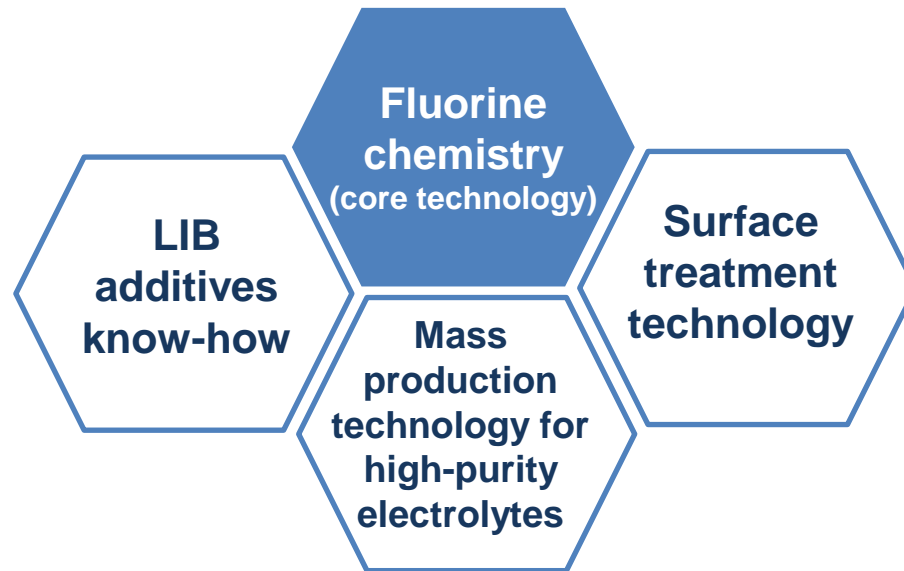
**New additive for advanced lithium-ion batteries**



Roll-out to automotive applications



Roll-out to residential applications



**Development of electrolyte for post lithium-ion batteries**



Launch of sodium ion battery prototypes (Image is for illustrative purposes only)

**Development of catalysts for fuel cells**



Fuel cell vehicle (FCV)



Residential fuel cell system

**We are leveraging our expertise and experience in fluorine chemistry with an aim to make original products that would serve as our next-generation prime source of earnings.**

# <New Additive for Advanced Lithium-ion Batteries>

## Development Phase

Conducted trials for a wide range of applications from in-car to stationary LIBs across the globe

We were highly rated for our advanced high capacity battery mechanism

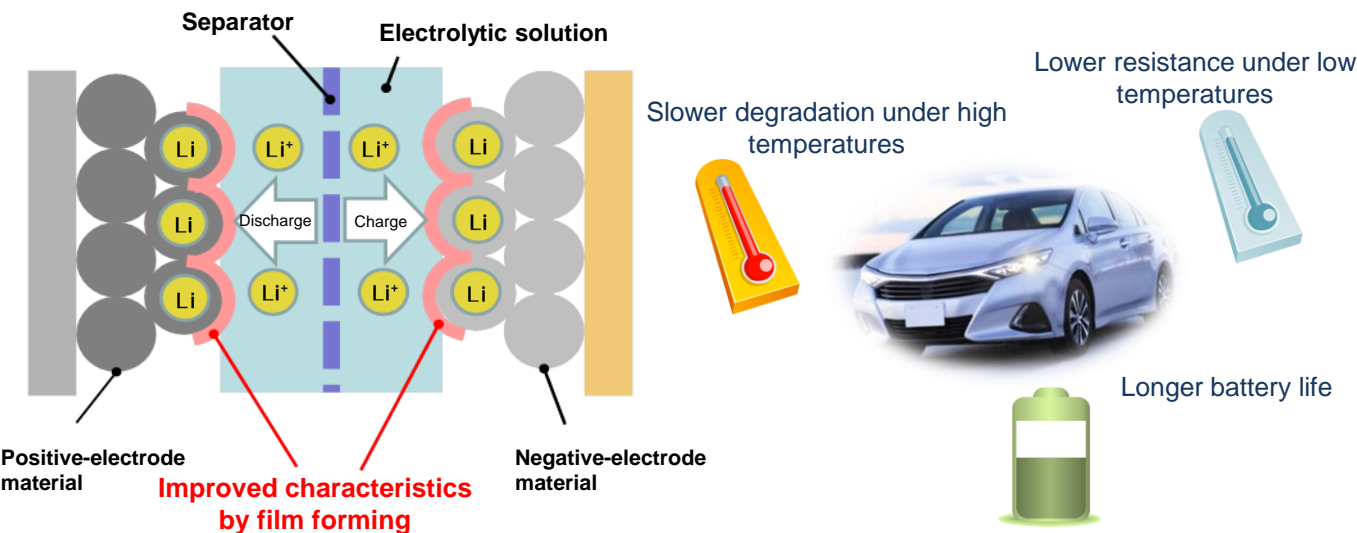
## Future Developments

Combine with user battery materials

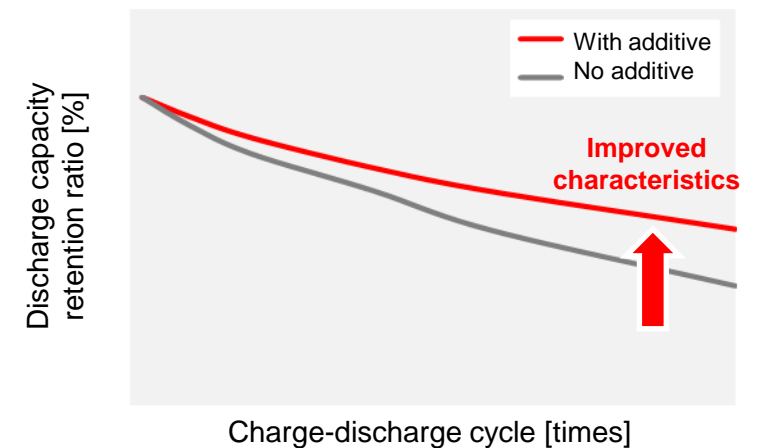
Work on developing mass production technique



Appearance of the new additive



New Additive Concept



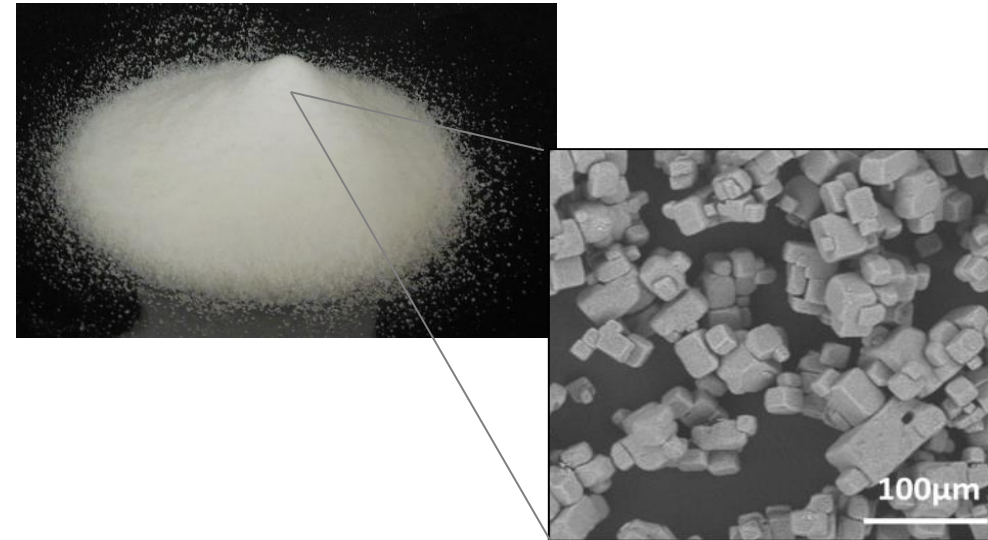
Effect of improved characteristics by new additive

# <Electrolyte for Post Lithium-ion Batteries>

## Development Phase

Developed a production process for high-purity NaPF<sub>6</sub> to be used in future mass production

Users rated our world-quality samples very high



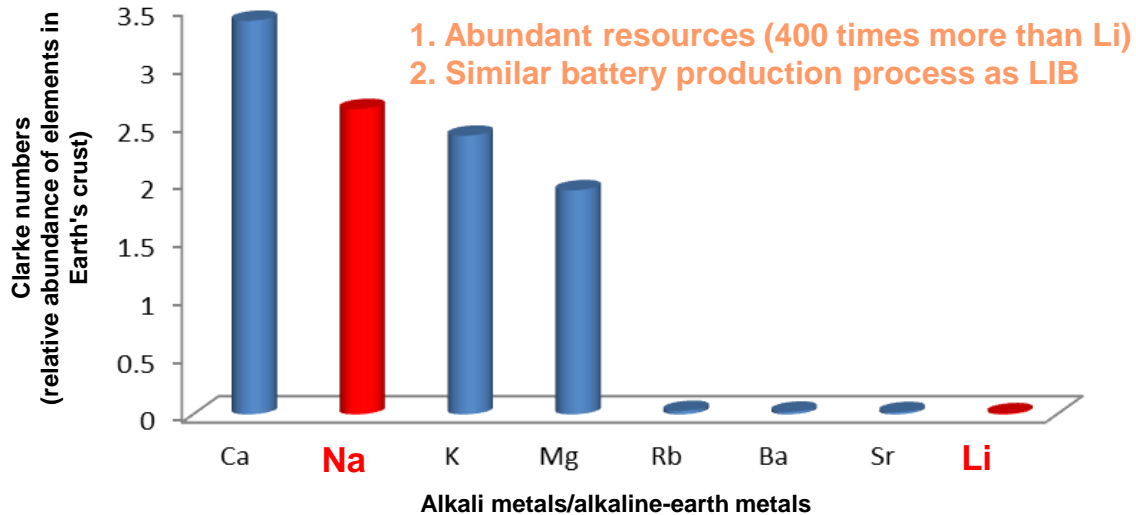
High-purity electrolyte for sodium-ion batteries (NaPF<sub>6</sub>)

## Future Developments

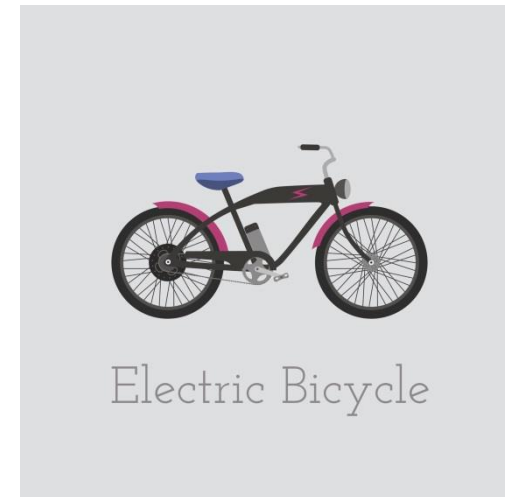
Work on developing mass production technique

### Importance of sodium-ion batteries

1. Abundant resources (400 times more than Li)
2. Similar battery production process as LIB



Comparison of resource amounts



Na-ion battery-equipped electric bicycle (Image is for illustrative purposes only)



# <Development of Catalysts for Polymer Electrolyte Fuel Cells (PEFCs)>

## Development Phase

Verified that the original surface treatment improved performance in a low humidity environment

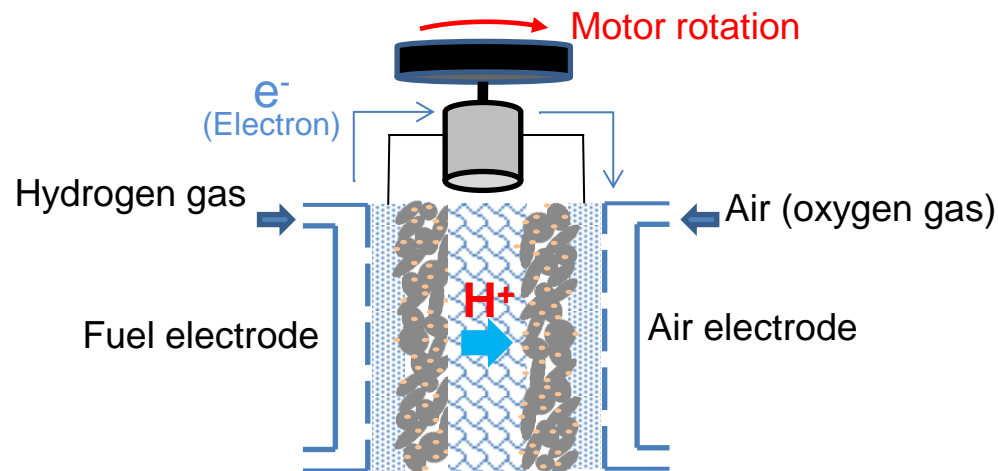
## Future Developments

To promote and begin trials for users

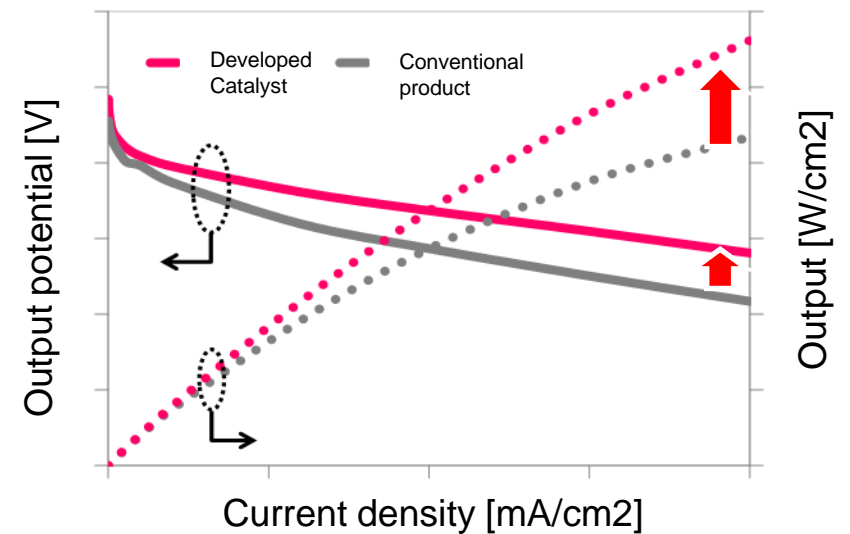
Move on to non-platinum catalyst research



Appearance of developed fuel cell catalyst



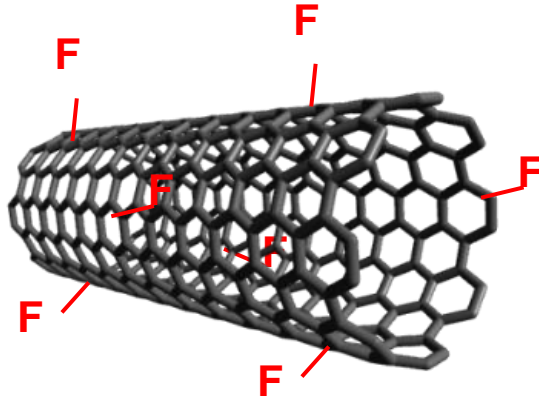
Conventional catalysts do not perform well in a low humidity environment.



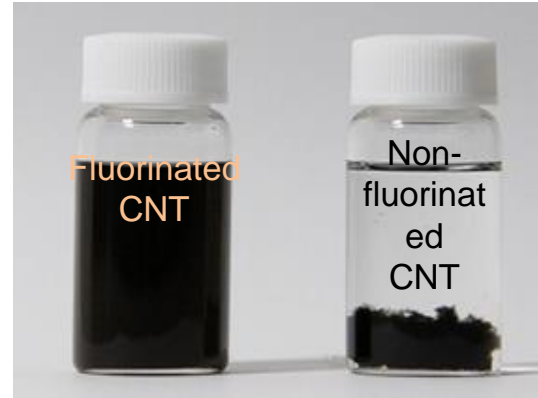
The newly developed catalyst performs better in a low humidity environment.

# <Fluorinated Carbon Nanotubes>

Fluorination of carbon nanotube

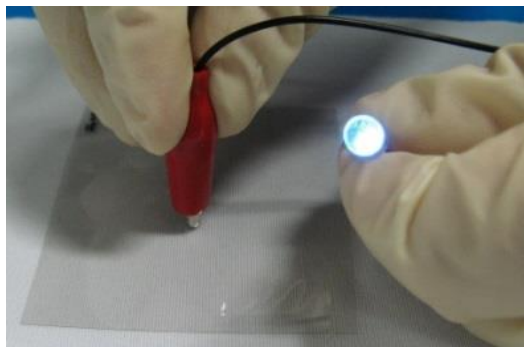


Fluorinated carbon nanotube dispersed liquid



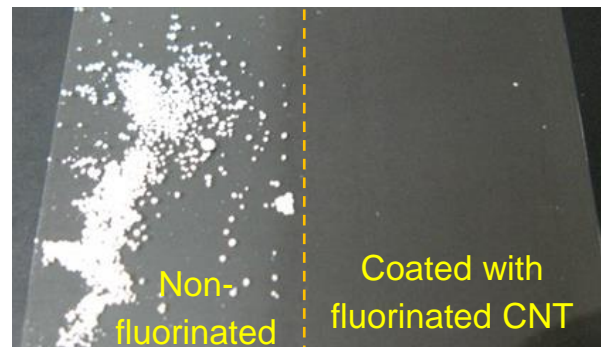
F-CNT dispersed liquid with high dispersibility without using any surfactant.

Transparent conducting film and antistatic film



Conductive film made with fluorinated CNT

Applications in displays



Antistatic film prototype sample

Applications in exterior coatings

Composite material (compounding of CNT and resin)



Epoxy resin

25% stronger

Fluorinated CNT epoxy composite

Applications in engineering plastics

# <Fluoride Nanoparticles>

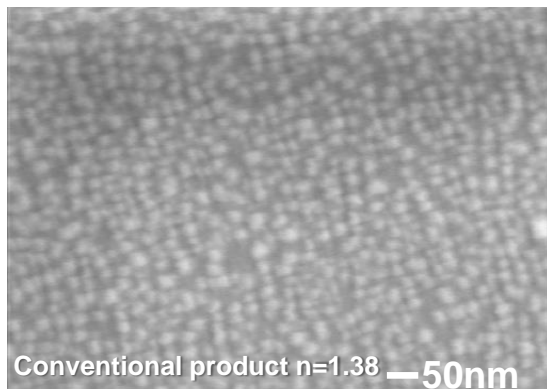
Development of low refractive index fluoride material for antireflection film



Evolution and market expansion of smart cars, IoT, and wearable devices

\*Image illustration

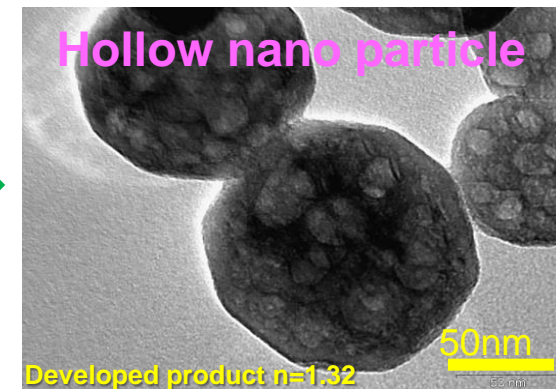
➡ Increased demand of coating material that increases display panel visibility



Hollow introduced in particles by particle morphology control



Achievement of low refractive index



## Corporate slogan

**Beyond the Chemical**

We are drawing upon the strengths in the chemical field whose growth we have nurtured so far and moving toward even greater development in the future.

High-purity chemical  
business field

Transportation  
business field

Medical  
business field



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