

Financial Results for 2Q of FYE 3/2018

Securities code: 4109

1. Financial Results for 2Q of FYE 3/2018

- 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 6M (Apr—Sep)		FYE 3/2017 6M (Apr—Sep)	YoY		Vs. Forecast	
	Actual	Forecast*	Actual	Increase/ Decrease	Percentage Increase/ Decrease	Increase/ Decrease	Percentage Increase/ Decrease
Sales Revenue	16,720	16,600	13,945	2,775	19.9	120	0.7
Operating Profit	1,825	2,200	1,985	-160	-8.1	-374	-17.0
Ordinary Profit	1,698	2,000	1,267	430	33.9	-301	-15.1
Quarterly Profit Attributable to Owners of Parent	1,027	1,200	926	100	10.9	-172	-14.4

(In millions of yen)	Sep.30,2017	FYE 3/2017 End of year	Increase/ Decrease
Total Assets	50,430	52,081	-1,650
Equity Capital	31,077	28,078	2,999
Interest-bearing Liabilities	10,319	13,967	-3,647

*Description of latest financial forecast
(Announced on August 8, 2017)

<Consolidated Statement of Income>

	FYE 3/2018 6M (Apr—Sep)	FYE 3/2017 6M (Apr—Sep)	YoY	
			Increase/ Decrease	Percentage Increase/ Decrease
Sales Revenue	16,720	13,945	2,775	19.9
Gross Profit	3,804	3,773	31	0.8
Gross Profit Margin (%)	22.8	27.1	-	-
SG&A	1,979	1,787	192	10.8
Operating Profit	1,825	1,985	-160	-8.1
Operating Profit Margin (%)	10.9	14.2	-	-
Ordinary Profit	1,698	1,267	430	33.9
Profit before Income Taxes	1,528	1,268	260	20.5
Quarterly Profit Attributable to Owners of Parent	1,027	926	100	10.9

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

■ Non-operating Profit and Loss

	FYE 3/2018 6M (Apr—Sep)	FYE 3/2017 6M (Apr—Sep)
(In millions of yen)		
Non-operating Profit	226	69
Interest income	5	5
Dividend income	1	0
Share of profit of entities accounted for using equity method	-	3
Gain on valuation of derivatives	172	-
Other	47	60
Non-operating Expenses	353	787
Interest expenses	24	25
Share of loss of entities accounted for using equity method	69	-
Loss on valuation of derivatives	-	274
Foreign exchange losses	173	421
Other	86	66

■ Extraordinary Profit and Loss

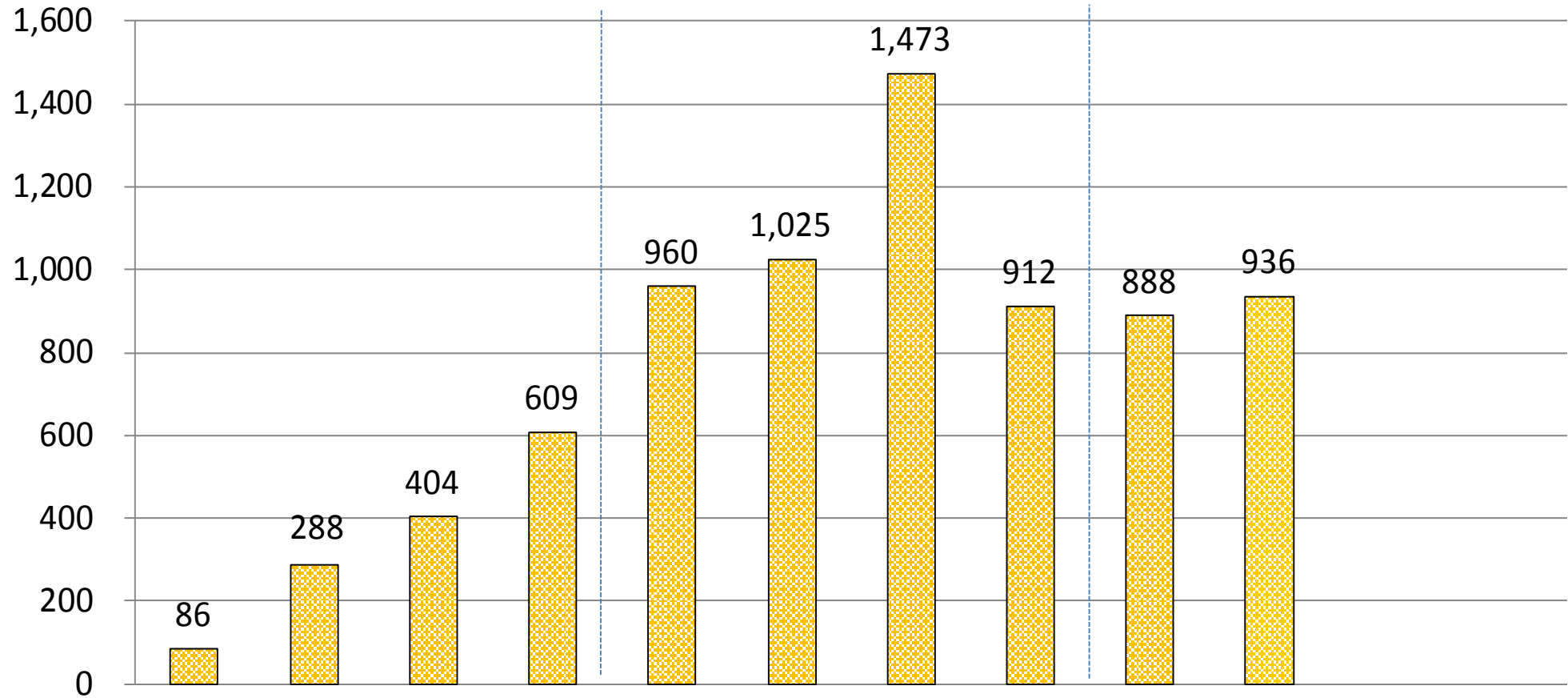
	FYE 3/2018 6M (Apr—Sep)	FYE 3/2017 6M (Apr—Sep)
(In millions of yen)		
Extraordinary Profit	14	16
Gain on sales of non-current assets	14	16
Extraordinary Losses	183	16
Loss on abandonment of non-current assets	183	15
Loss on sales of non-current assets	0	0
Loss on sales of investment securities	-	0

<Sales Revenue and Operating Profit by Business>

(In millions of yen)		FYE 3/2018 6M (Apr—Sep)		FYE 3/2017 6M (Apr—Sep)		Percentage Increase/ Decrease	
		Sales Revenue	Operating Profit	Sales Revenue	Operating Profit	Sales Revenue	Operating Profit
High-purity Chemical Business		14,534	1,865	11,825	2,009	22.9	-7.2
[High-purity Chemical Business: Breakdown]	Surface Treatment	923		959		-3.8	
	Alternatives for CFCs	1,472		920		60.0	
	Batteries	2,875		2,508		14.6	
	Semiconductors/LCDs	7,264		5,756		26.2	
	Semiconductor Devices	360		198		81.4	
	Catalysts	452		389		16.3	
	Gypsum	48		35		36.8	
	General products	676		691		-2.3	
	Other	460		365		26.1	
Transportation Business		2,087	376	2,014	338	3.6	11.3
Medical Business		-	-440	-	-385	-	-
Other Business		98	15	105	14	-6.6	7.5

<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		
Operating Profit	86	288	404	609	960	1,025	1,473	912	888	936		
Operating Profit Margin	1.3%	4.1%	6.0%	8.8%	13.4%	15.2%	18.6%	11.5%	10.9%	10.9%		

<Consolidated Balance Sheet>

(In millions of yen)	Sep.30,2017	FYE 3/2017 End of Year	Increase/ Decrease
Current Assets	27,132	28,069	-937
Cash and Deposits	10,501	14,361	-3,860
Notes and Accounts Receivable - trade	10,342	7,867	2,474
Non-current Assets	23,298	24,011	-712
Property, Plant and Equipment	21,531	22,072	-541
Intangible Assets	121	129	-7
Investments and Other Assets	1,645	1,808	-163
Current liabilities	10,631	12,566	-1,934
Short-term Loans Payable	1,840	2,320	-480
Long-term Loans Payable within 1 year	3,273	3,684	-410
Non-current liabilities	7,289	9,998	-2,709
Bonds Payable	-	2,000	-2,000
Long-term Loans Payable	5,205	5,962	-756
Net Assets	32,510	29,516	2,993
Shareholders' Equity	30,780	27,771	3,009
Liabilities and Net Assets	50,430	52,081	-1,650

<Consolidated Cash Flows, Capital Expenditures, Depreciation & Amortization, Research & Development Expenses>

(1) Consolidated Statement of Cash Flows

(In millions of yen)	FYE 3/2018 6M (Apr—Sep)	FYE 3/2017 6M (Apr—Sep)
Cash flows from operating activities (*1)	-611	1,865
Cash flows from investing activities (*2)	-1,527	-468
Free Cash Flows (*1 + *2)	-2,138	1,396
Cash flows from financing activities	-1,673	806
Net increase (decrease) in cash and cash equivalents	-3,916	2,034
Cash and cash equivalents, beginning of year	14,169	10,154
Cash and cash equivalents, end of year	10,252	12,188

(2) Capital Expenditures, Depreciation & Amortization, Research & Development Expenses

(In millions of yen)	FYE 3/2018 6M (Apr—Sep)	FYE 3/2017 6M (Apr—Sep)
Capital Expenditures	1,186	558
Depreciation & Amortization	1,642	1,556
Research & Development Expenses	695	618

2. Financial Forecast for FYE 3/2018

- Financial Forecast
- Financial Forecast by Segment

<Financial Forecast>

*Description of financial forecast announced on Aug. 8, 2017

(In millions of yen)	FYE 3/2018 Revised Full-year forecast*	FYE 3/2018 Full-year forecast at beginning of year	FYE 3/2017 Full-year results	FYE 3/2016 Full-year results
Sales Revenue	33,300	30,472	29,850	27,509
Operating Profit	4,700	3,350	4,372	1,388
Ordinary Profit	4,700	3,323	4,154	1,044
Net Profit Attributable to Owners of Parent	3,300	2,497	2,824	1,323
Current Net Profit Per Share	268.20	203.01	234.56	110.33
Capital Expenditures	3,010	3,010	2,328	1,302
Depreciation & Amortization	3,309	3,309	3,117	3,525
Research & Development Expenses	1,613	1,557	1,274	1,163

<Financial Forecast by Segment>

*Description of financial forecast announced on August 8, 2017

(In millions of yen)		FYE 3/2018 Revised Full-year forecast*		FYE 3/2018 Full-year forecast at beginning of year		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
High-purity Chemical Business		29,100	5,030	26,016	3,687	25,501	4,422	23,087	1,390
[High-purity Chemical Business: Breakdown]	Surface Treatment	1,720		1,808		2,033		2,097	
	Alternatives for CFCs	3,410		2,089		2,463		2,023	
	Batteries	5,670		6,438		5,072		2,989	
	Semiconductors/LCDs	14,350		12,304		12,310		12,224	
	Semiconductor Devices	760		464		527		545	
	Catalysts	770		814		854		846	
	Gypsum	110		80		94		107	
	General products	1,450		1,374		1,342		1,461	
	Other	860		640		803		791	
Transportation Business		4,020	720	4,269	635	4,143	698	4,195	664
Medical Business		-	-1,080	-	-1,019	-	-792	-	-691
Other Business		180	30	187	31	204	30	226	6

3. STELLA CHEMIFA CORPORATION

- Corporate Profile/Sales Office Locations/Plant Locations (as of September 30, 2017)
- List of Affiliated Companies
- Manufacture and Sale of High-purity Chemical Business

<Corporate Profile/Sales Office Locations/Plant Locations (as of September 30, 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 ₂ , PbF ₂ , MgF ₂ , AlF ₃ , 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

- 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)

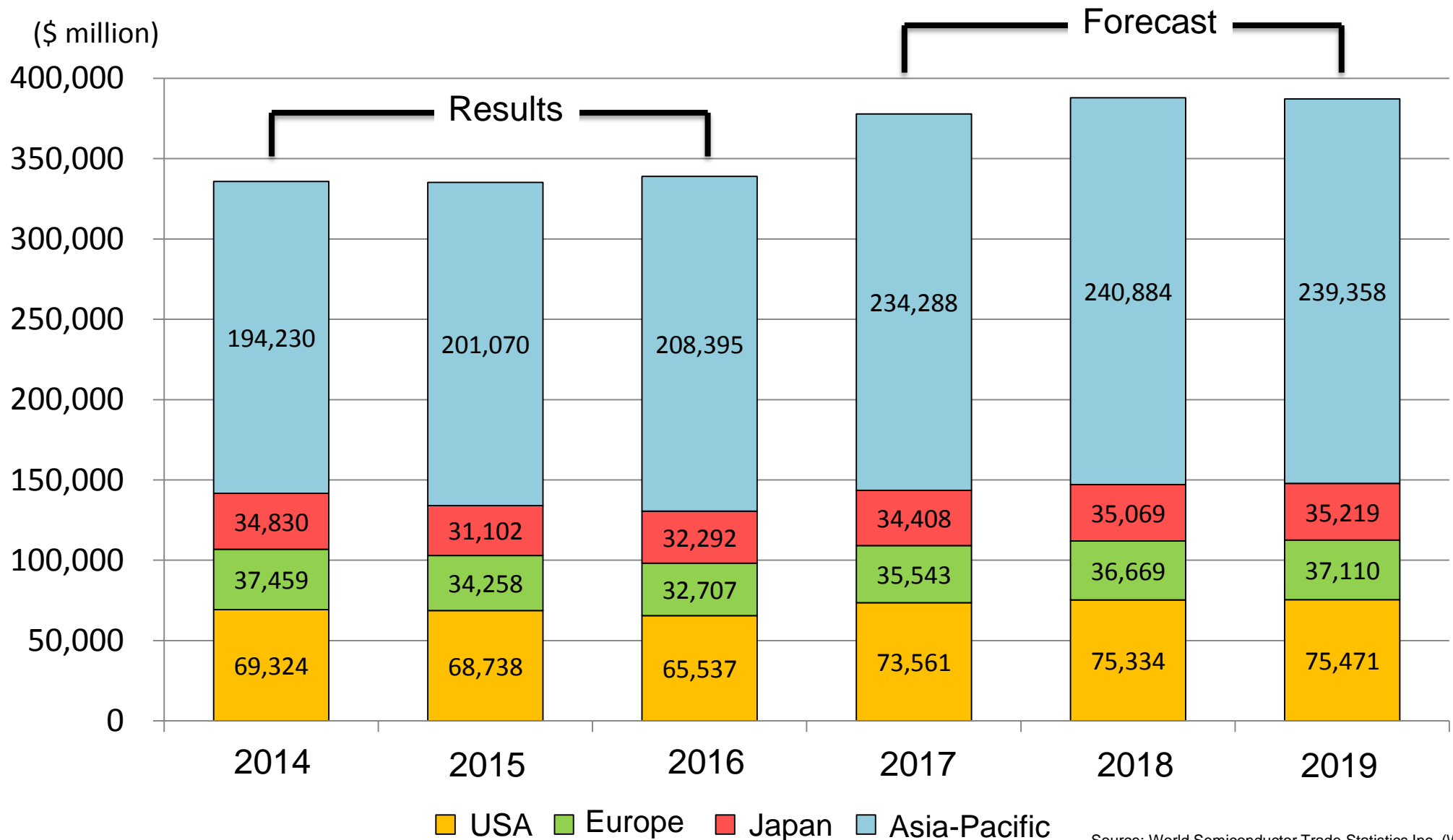
<Features of our products>

(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; YMT *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 ◆

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

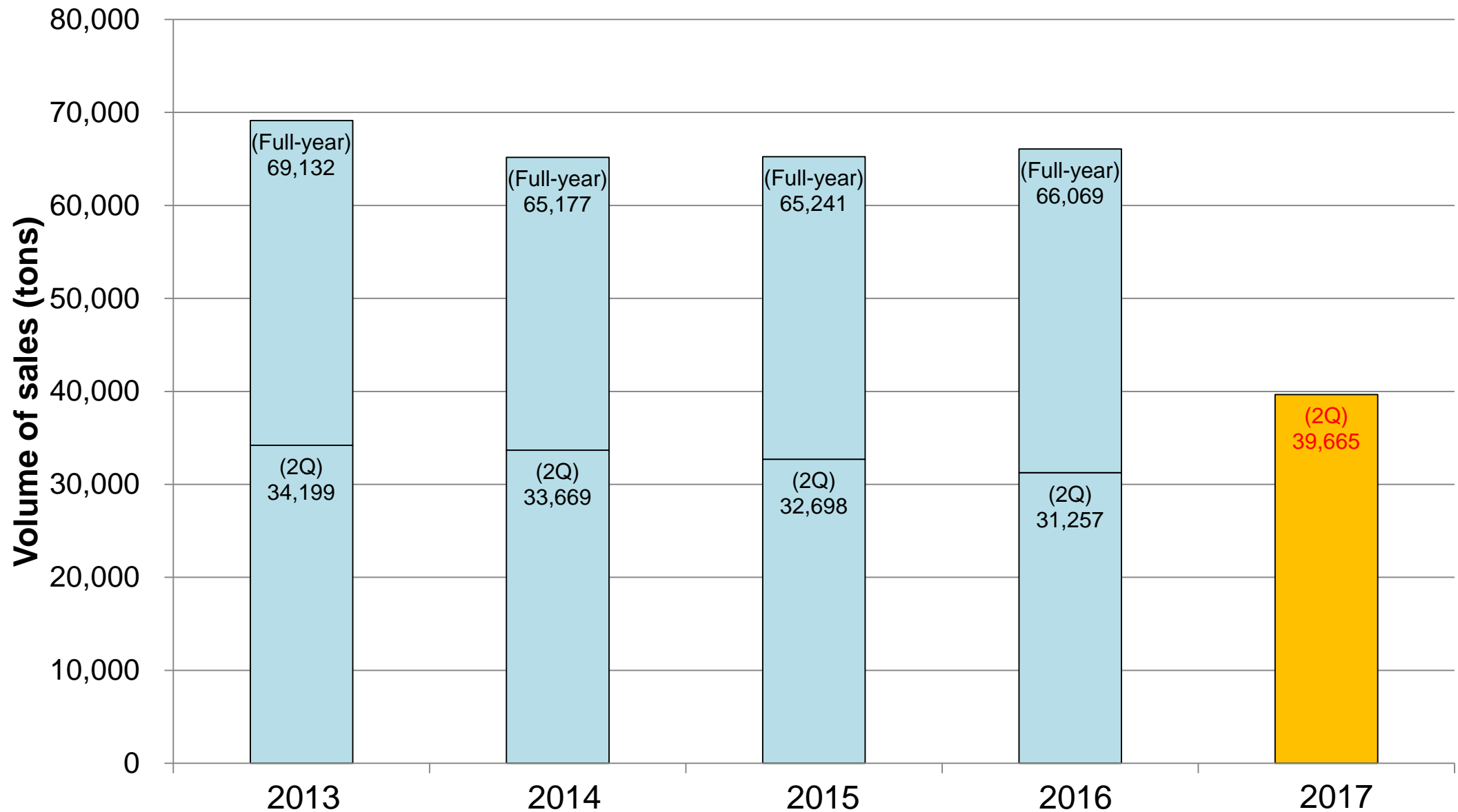
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High resolution ICP-MS

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



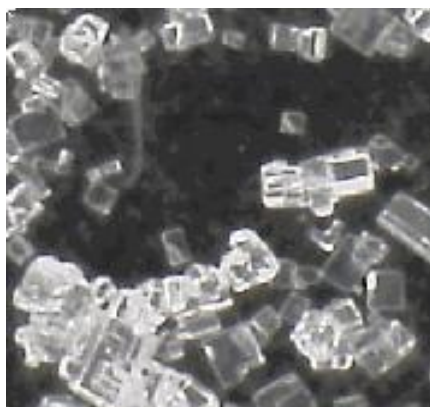
Batteries

- 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>

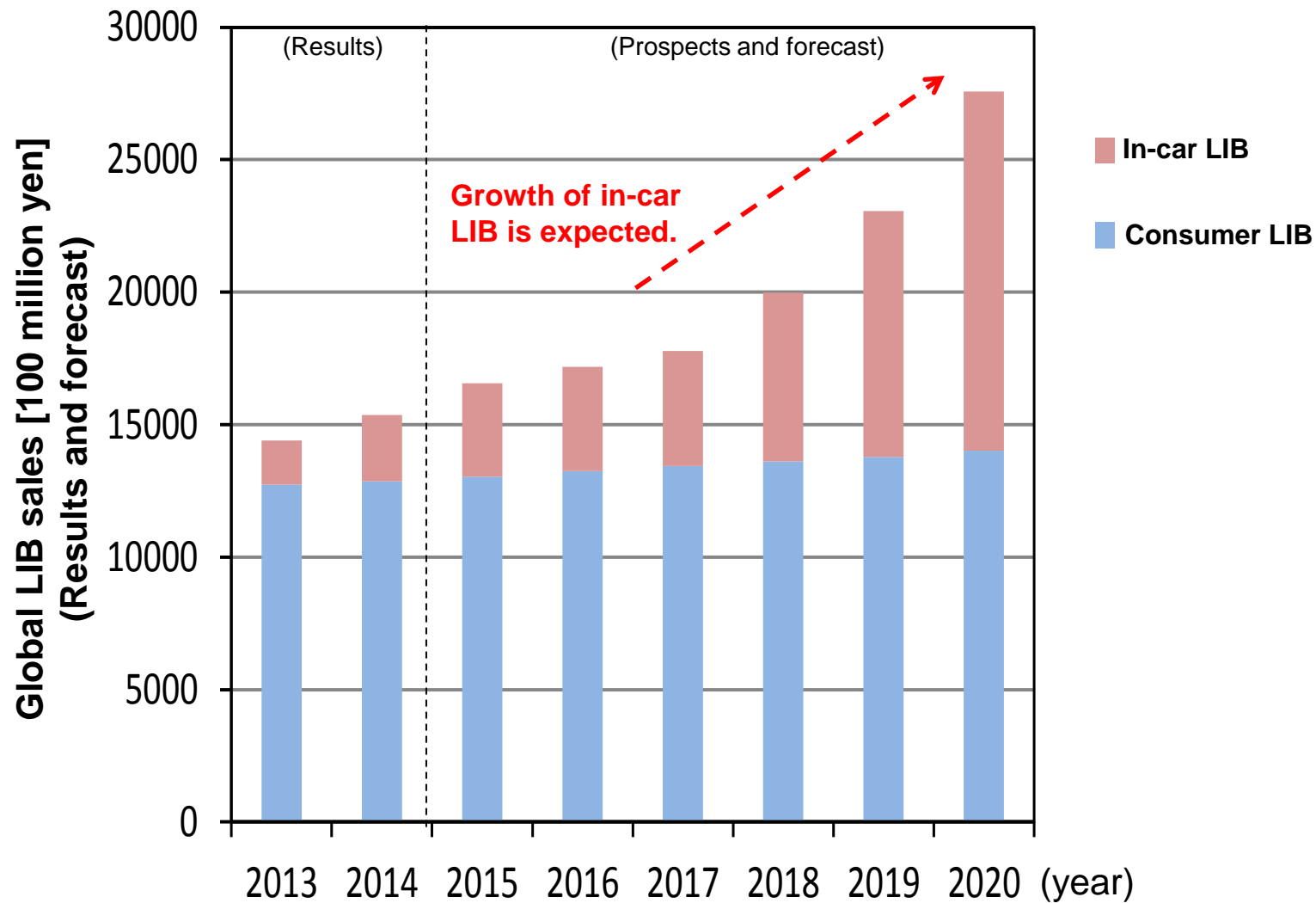


<Lithium tetra fluoroborate>



<Large-size container: 1 m³>

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



Source: Materials of Fuji Chimera Research Institute, Inc.

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



<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 ₆) 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

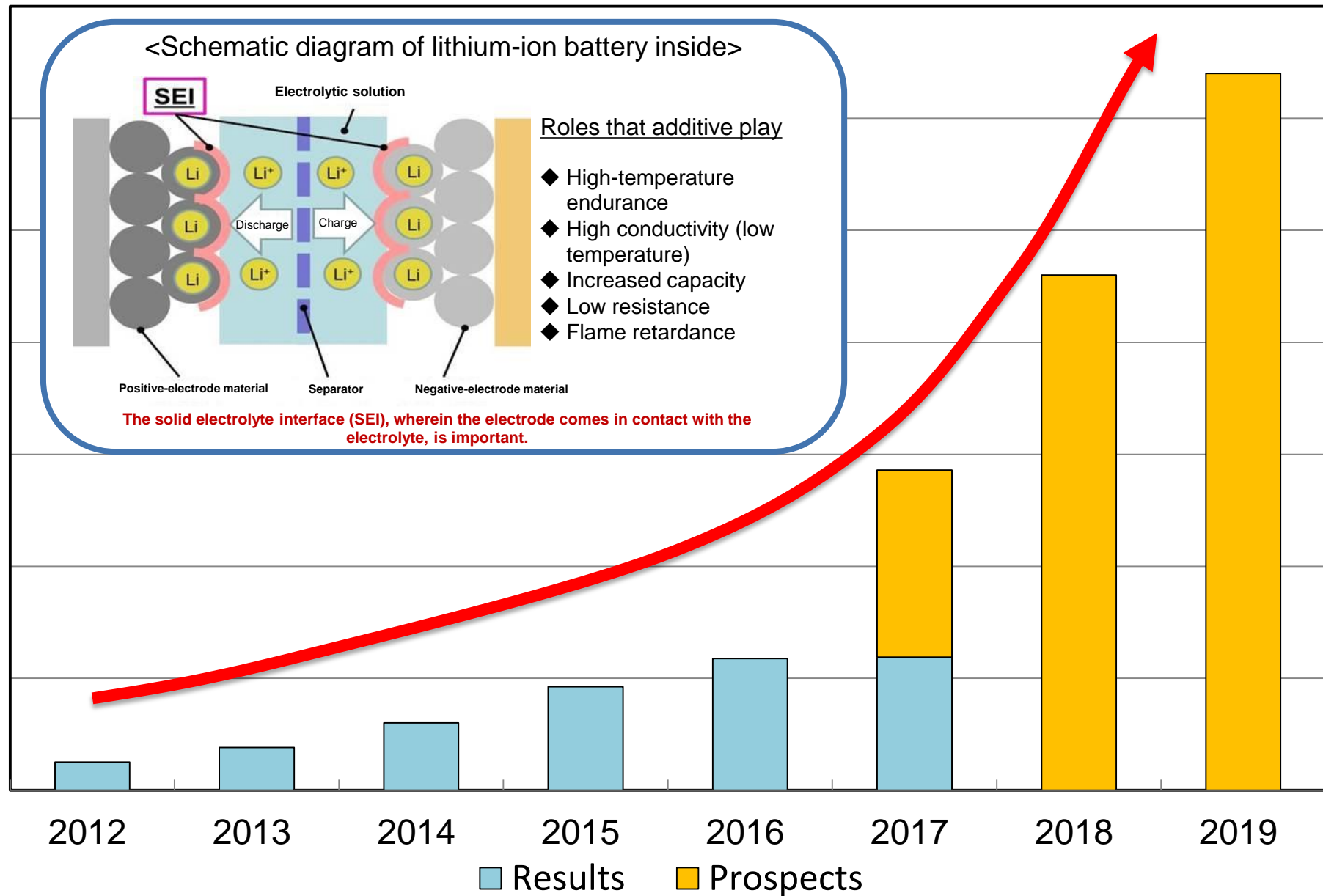
Start of operation of manufacturing facilities.

(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

- 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

- Corporate Profile (as of September 30, 2017)
- Boron Neutron Capture Therapy (BNCT)
- Establishment of enrichment technology/Features of enriched Boron/Applications of ^{10}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 September 30, 2017)>

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

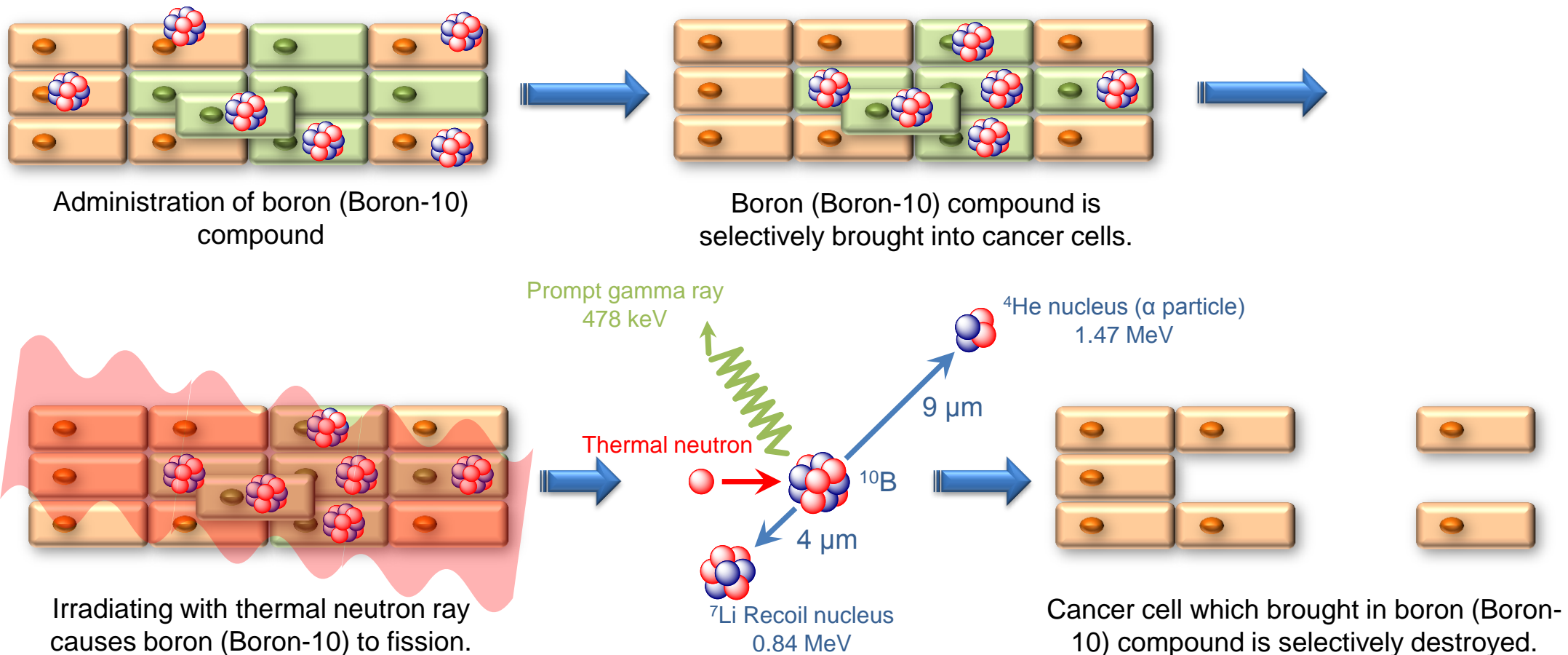


STELLA PHARMA

<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.



■ Establishment of enrichment technology

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



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

■ Features of enriched Boron

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

■ Applications of ^{10}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)**

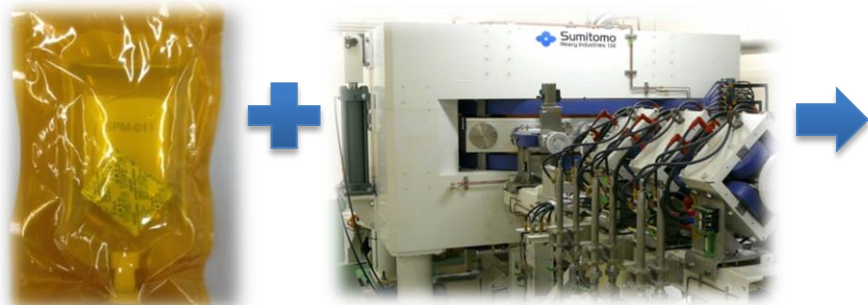
<World's First Accelerator-based BNCT Clinical Trial>

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

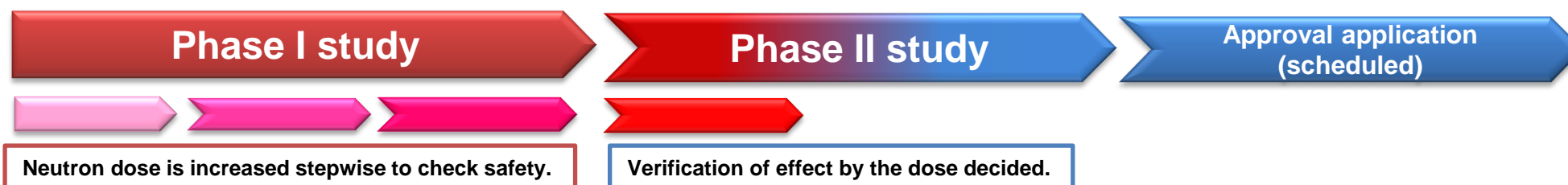


World's first BNCT clinical trial

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



<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"> Recurrent malignant gliomas Unresectable locally recurrent head and neck cancer and locally-advanced head and neck cancer (non-squamous cell carcinoma) 	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’”

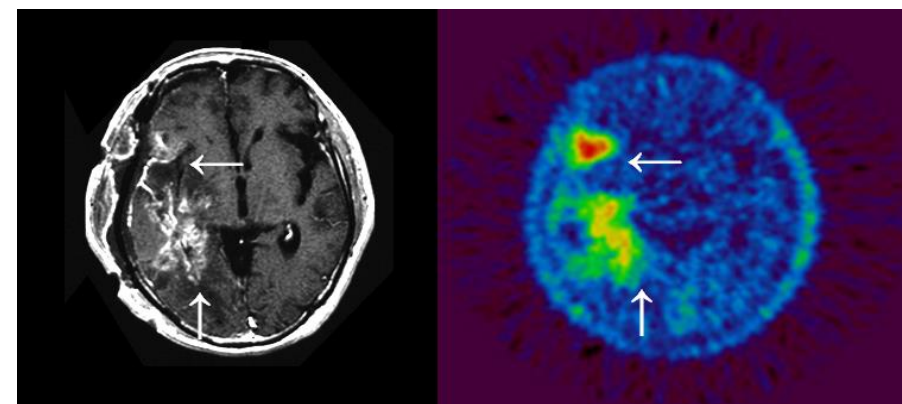
When an innovative new drug or medical device satisfies severity and other specified requirement of applicable diseases, the drug or the medical device which MHLW evaluates and assigns is given priorities in consultation and review process for its approval by using this system, and the target NDA review 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}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}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}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}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.

Photo: Courtesy of Professor Ono at Kyoto University Research Reactor Institute

5. Transportation Business

- Corporate Profile (as of September 30, 2017)
- Transportation System by Cooperation with Domestic Bases
- Overseas Bases
- International Intermodal Logistics System
- Future Activities

<Corporate Profile (as of September 30, 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

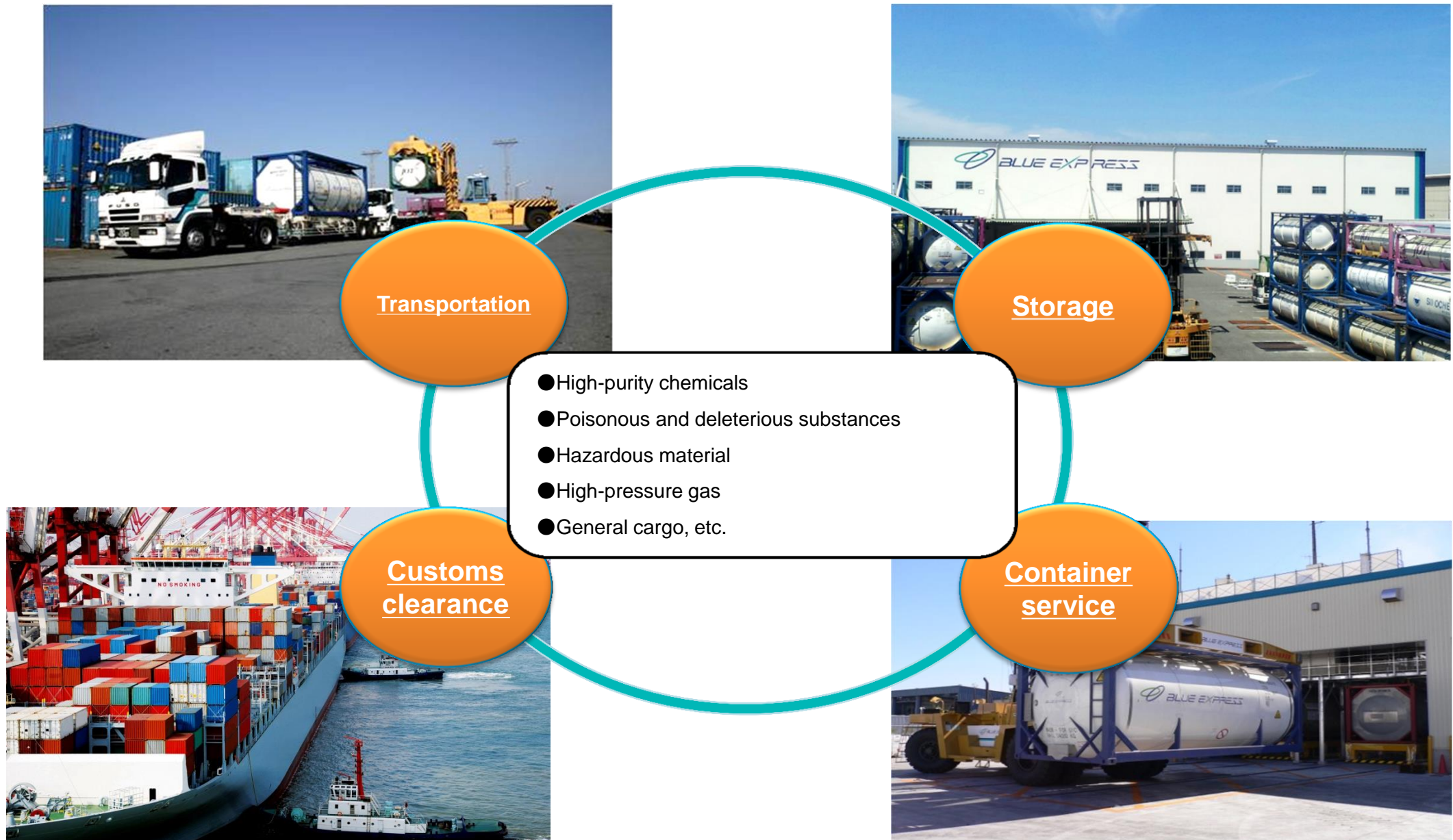
Kitakyushu Office
Opened in October 2014



<Overseas Bases>



<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

- 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>

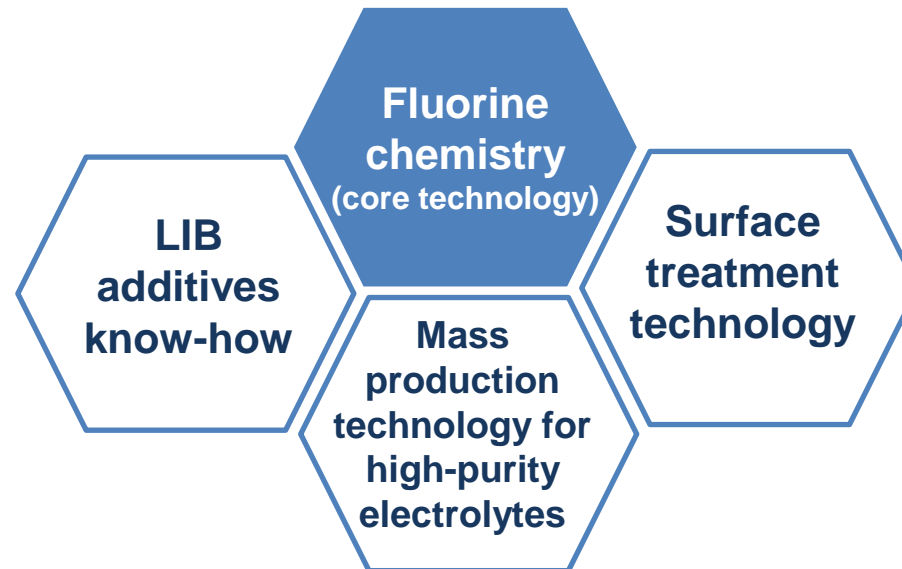
**New additive for
advanced lithium-ion
batteries**



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

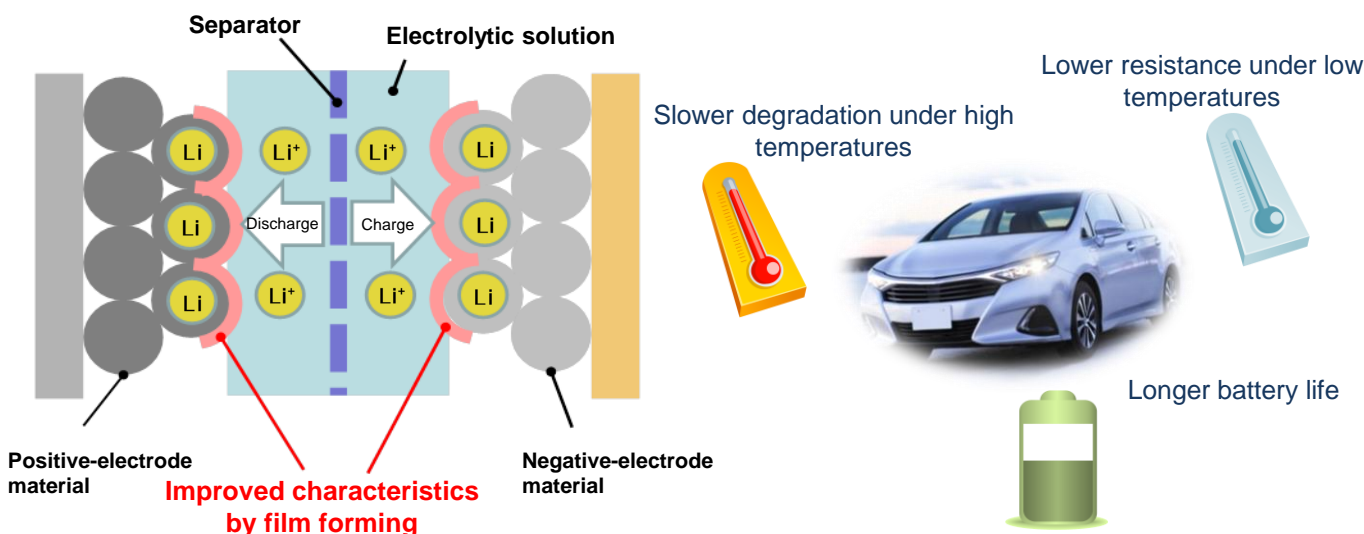
Future Developments

Combine with user battery materials

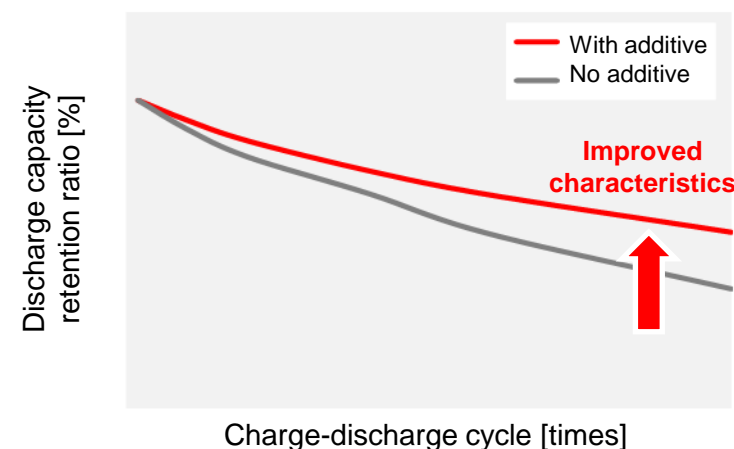
Work on developing mass production technique



Appearance of the new additive



New Additive Concept



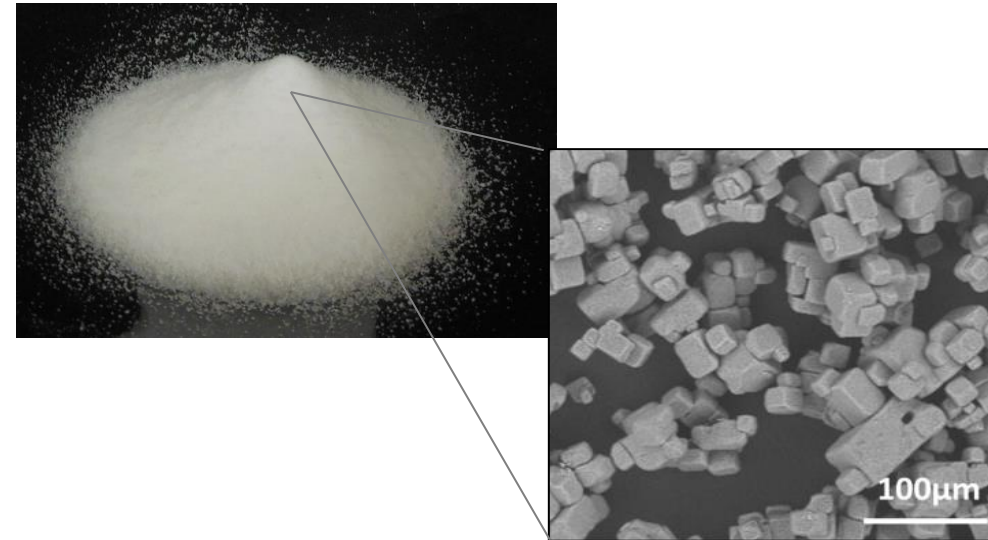
Effect of improved characteristics by new additive

<Electrolyte for Post Lithium-ion Batteries>

Development Phase

Developed a production process for high-purity NaPF₆ to be used in future mass production

Users rated our world-quality samples very high

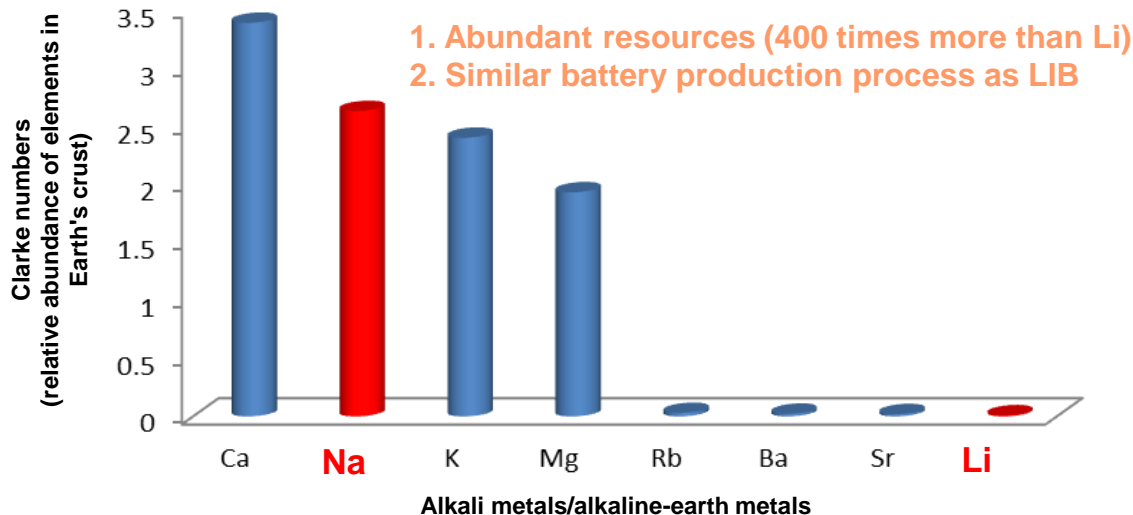


High-purity electrolyte for sodium-ion batteries (NaPF₆)

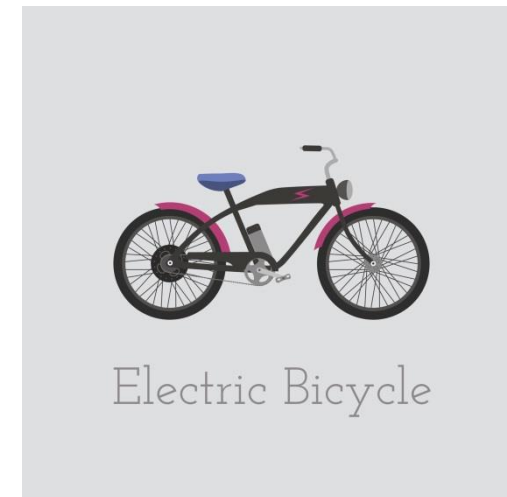
Future Developments

Work on developing mass production technique

Importance of sodium-ion batteries



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

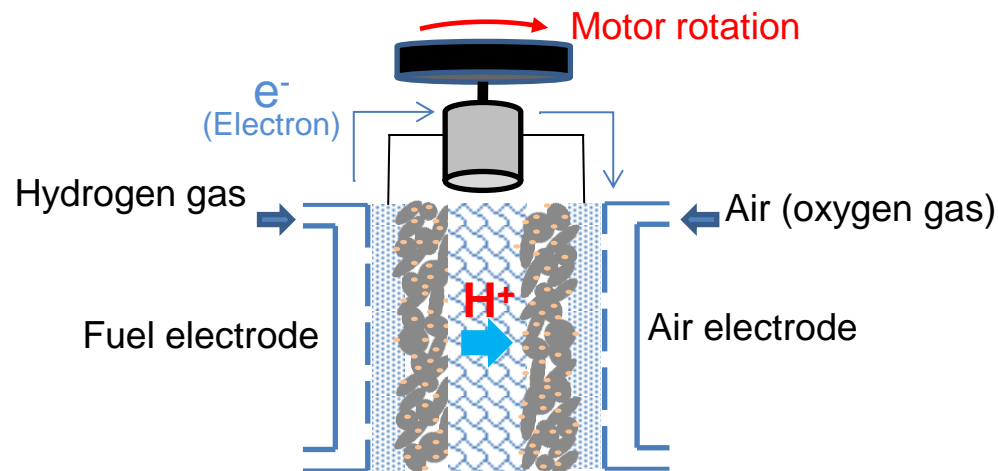
Future Developments

To promote and begin trials for users

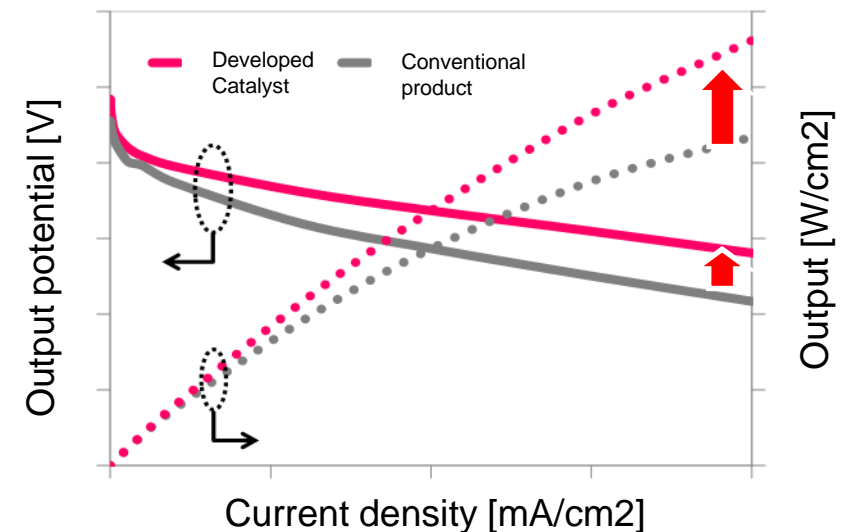
Move on to non-platinum catalyst research



Appearance of developed fuel cell catalyst



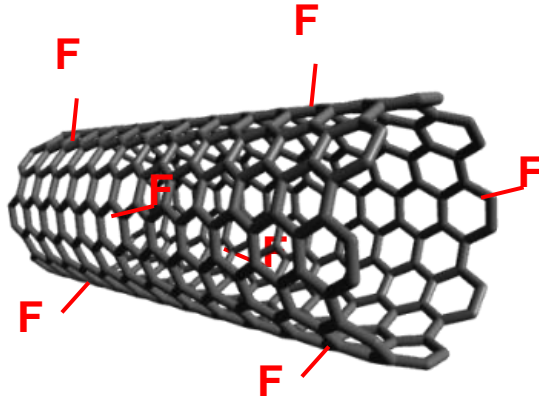
Conventional catalysts do not perform well in a low humidity environment.



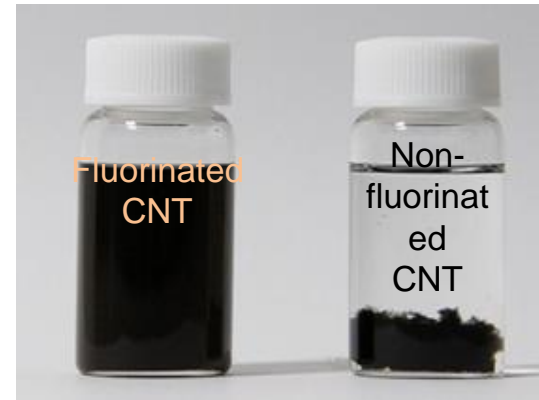
The newly developed catalyst performs better in a low humidity environment.

<Fluorinated Carbon Nanotubes>

Fluorination of carbon nanotube

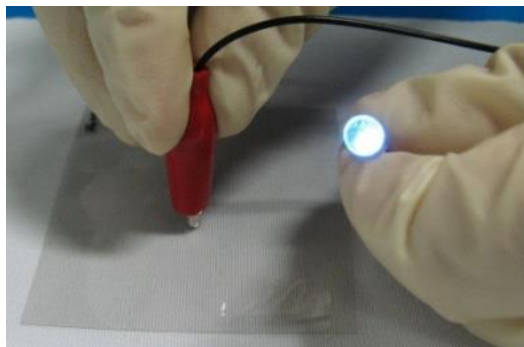


Fluorinated carbon nanotube dispersed liquid



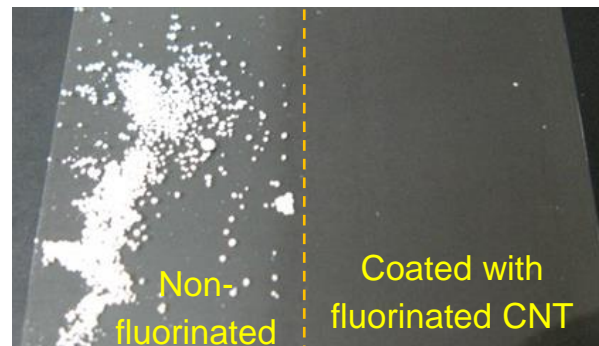
F-CNT dispersed liquid with high dispersibility without using any surfactant.

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

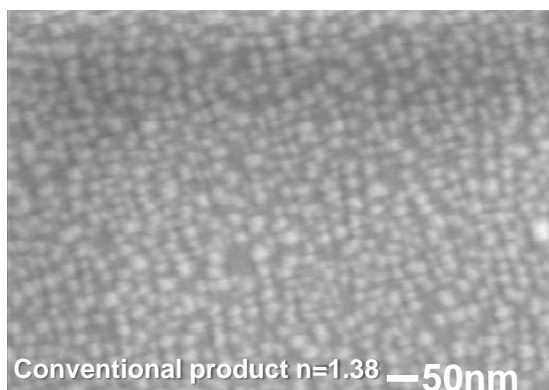


Evolution and market expansion of smart cars, IoT, and wearable devices

*Image illustration



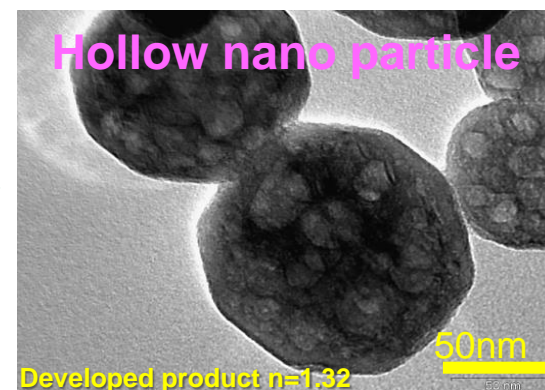
Increased demand of coating material that increases display panel visibility



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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