Financial Results for 3Q (Nine months) of FYE 3/2019

Securities Code: 4109

Beyond the Chemical

1. Financial Results for 3Q (Nine months) of FYE 3/2019

- 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
- Capital Expenditures, Depreciation & Amortization, Research & Development Expenses

<Basic Financial Data (Consolidated)>

(In millions of yen)	3Q (Nine months) of FYE 3/2019	3Q (Nine months) of FYE 3/2018	YoY	
	Actual	Actual	Increase/Decrease	Percentage Increase/ Decrease
Sales Revenue	28,734	25,034	3,699	14.8
Operating Profit	2,887	2,286	600	26.3
Ordinary Profit	3,196	2,119	1,076	50.8
Quarterly Profit Attributable to Owners of Parent	1,980	1,441	538	37.4

(In millions of yen)	Dec.31,2018	FYE 3/2018 End-of-Year	Increase/ Decrease
Total Assets	53,532	51,373	2,158
Equity Capital	32,542	31,233	1,309
Interest-bearing Liabilities	11,808	10,857	950

<Consolidated Statement of Income>

(In millions of yen)	3Q (Nine months) of FYE 3/2019	3Q (Nine months) of FYE 3/2018	YoY	
			Increase/ Decrease	Percentage Increase/ Decrease
Sales Revenue	28,734	25,034	3,699	14.8
Gross Profit	6,087	5,336	750	14.1
Gross Profit Margin (%)	21.2	21.3	-	-
SG&A	3,200	3,050	149	4.9
Operating Profit	2,887	2,286	600	26.3
Operating Profit Margin (%)	10.0	9.1	-	-
Ordinary Profit	3,196	2,119	1,076	50.8
Quarterly Profit before Income Taxes	3,117	1,935	1,181	61.0
Quarterly Profit Attributable to Owners of Parent	1,980	1,441	538	37.4

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

■ Non-operating Profit and Loss

(In millions of yen)	3Q (Nine months) of FYE 3/2019	3Q (Nine months) of FYE 3/2018
Non-operating Profit	**594**	**236**
Interest income	11	6
Dividend income	2	2
Gain on valuation of derivatives	310	159
Foreign Exchange Gains	118	-
Other	151	68
Non-operating Expenses	**285**	**403**
Interest expenses	26	32
Share of loss of entities accounted for using equity method	234	67
Foreign exchange losses	-	166
Other	24	136

■ Extraordinary Profit and Loss

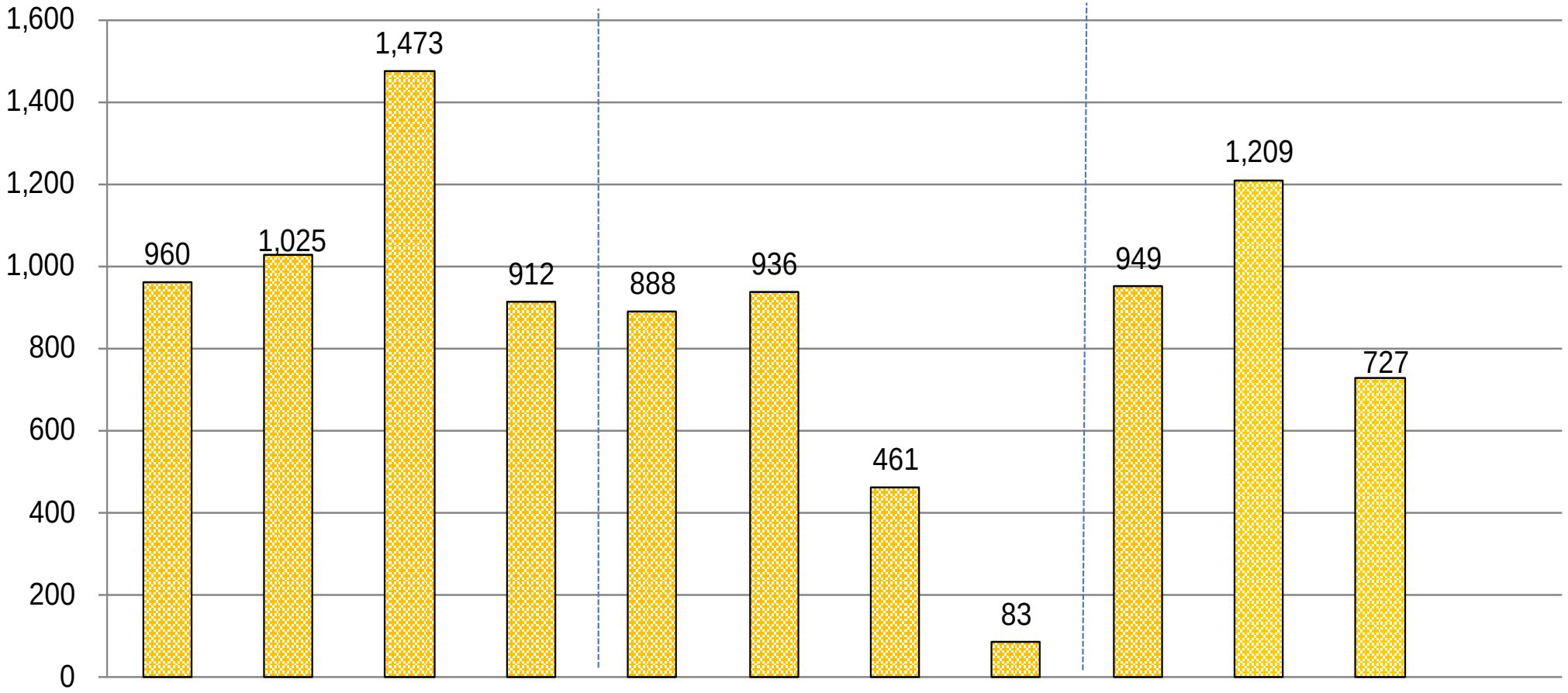
(In millions of yen)	3Q (Nine months) of FYE 3/2019	3Q (Nine months) of FYE 3/2018
Extraordinary Profit	**14**	**18**
Gain on sales of non- current assets	13	18
Other extraordinary income	0	-
Extraordinary Losses	**93**	**203**
Loss on abandonment of non-current assets	93	203
Loss on sales of non-current assets	-	0

<Sales Revenue and Operating Profit by Business>

(In millions of yen)		3Q (Nine months) of FYE 3/2019 Sales Revenue	3Q (Nine months) of FYE 3/2019 Operating Profit	3Q (Nine months) of FYE 3/2018 Sales Revenue	3Q (Nine months) of FYE 3/2018 Operating Profit	Percentage Increase/Decrease Sales Revenue	Percentage Increase/Decrease Operating Profit
High-purity Chemical Business		**25,261**	**3,008**	**21,693**	**2,347**	**16.4**	**28.2**
[High-Purity Chemical Business: Breakdown]	Surface Treatment	1,672		1,409		18.6	
	Alternatives for CFCs	2,599		1,855		40.1	
	Batteries	2,897		4,081		−29.0	
	Semiconductors/ LCDs	14,948		11,375		31.4	
	Semiconductor Devices	531		517		2.7	
	Catalysts	716		716		0.1	
	Gypsum	90		62		44.3	
	General products	1,130		977		15.7	
	Other	673		697		−3.5	
Transportation Business		**3,325**	**598**	**3,194**	**604**	**4.1**	**−1.0**
Medical Business		**-**	**−766**	**-**	**−704**	**-**	**-**
Other		**147**	**29**	**146**	**26**	**0.4**	**10.0**

<Quarterly Operating Profit>

(In millions of yen)



(In millions of yen)	FYE 3/2017				FYE 3/2018				FYE 3/2019			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Sales Revenue	7,187	6,757	7,941	7,963	8,159	8,561	8,314	8,587	10,134	9,323	9,275	
Operating Profit	960	1,025	1,473	912	888	936	461	83	949	1,209	727	
Operating Profit Margin	13.4%	15.2%	18.6%	11.5%	10.9%	10.9%	5.5%	1.0%	9.4%	13.0%	7.8%	

<Consolidated Balance Sheet>

(In millions of yen)	Dec.31,2018	FYE 3/2018 End-of-Year	Increase/ Decrease
Current Assets	**30,142**	**26,101**	4,040
Cash and Deposits	13,718	9,192	4,526
Notes and Accounts Receivable - trade	9,824	9,753	71
Non-current Assets	**23,390**	**25,272**	-1,882
Property, Plant and Equipment	21,458	21,654	-196
Intangible Assets	359	144	215
Investments and Other Assets	1,572	3,473	-1,901
Current liabilities	**10,414**	**10,617**	-202
Short-term Loans Payable	1,975	1,860	115
Long-term Loans Payable within 1 year	2,493	2,794	-301
Non-current liabilities	**9,404**	**8,271**	1,133
Long-term Loans Payable	7,340	6,203	1,136
Net Assets	**33,713**	**32,485**	1,228
Shareholders' Equity	32,214	30,768	1,446
Liabilities and Net Assets	**53,532**	**51,373**	2,158

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

(In millions of yen)	3Q (Nine months) of FYE 3/2019	3Q (Nine months) of FYE 3/2018
Capital Expenditures	2,503	1,987
Depreciation & Amortization	2,358	2,502
Research & Development Expenses	1,131	1,088

2. Financial Forecast for FYE 3/2019

- Financial Forecast
- Forecast by Segment

<Financial Forecast>

(In millions of yen)	FYE 3/2019 Revised Full-Year Forecast (Feb.8 2019)	FYE 3/2019 Full-Year Forecast	FYE 3/2018 Full-Year Results	FYE 3/2017 Full-Year Results
Sales Revenue	38,700	37,700	33,622	29,850
Operating Profit	3,450	2,600	2,369	4,372
Ordinary Profit	3,750	2,800	1,756	4,154
Profit Attributable to Owners of Parent	2,400	1,700	1,274	2,824
Current Net Profit Per Share (yen)	185.86	131.65	100.49	234.56
Capital Expenditures	4,000	3,983	2,991	2,328
Depreciation & Amortization	3,200	3,414	3,344	3,117
Research & Development Expenses	1,550	1,629	1,484	1,274

<Financial Forecast by Segment>

(In millions of yen)		FYE 3/2019 Revised Full-Year Forecast (Feb.8 2019)		FYE 3/2019 Full-Year Forecast		FYE 3/2018 Full-Year Results		FYE 3/2017 Full-Year Results	
		Sales Revenue	Operating Profit	Sales Revenue	Operating Profit	Sales Revenue	Operating Profit	Sales Revenue	Operating Profit
High-purity Chemical Business		**34,010**	**3,610**	**33,110**	**2,930**	**29,145**	**2,500**	**25,501**	**4,422**
[High-purity Chemical Business: Breakdown]	Surface Treatment	2,150		2,110		1,956		2,033	
	Alternatives for CFCs	3,550		3,080		2,546		2,463	
	Batteries	3,630		4,700		5,069		5,072	
	Semiconductors/LCDs	20,180		19,240		15,662		12,310	
	Semiconductor Devices	700		600		693		527	
	Catalysts	930		920		919		854	
	Gypsum	150		80		72		94	
	General products	1,880		1,650		1,267		1,342	
	Other	840		730		958		803	
Transportation Business		**4,470**	**800**	**4,380**	**680**	**4,269**	**779**	**4,143**	**698**
Medical Business		**-**	**−1,010**	**-**	**−1,050**	**-**	**−960**	**-**	**−792**
Other Business		**220**	**30**	**210**	**30**	**207**	**34**	**204**	**30**

3. STELLA CHEMIFACORPORATION

- Corporate Profile/Sales Office Locations/Plant Locations
  (as of December 31, 2018)
- List of Affiliated Companies
- High-purity Chemical Business

<Corporate Profile/Sales Office Locations/Plant Locations (as of December 31, 2018)>

◆ Corporate profile

Corporate name:	STELLA CHEMIFA CORPORATION
Head Office:	Meiji Yasuda Seimei Osaka Midosuji Bldg. 10F, 4-1-1 Fushimi-machi, Chuo-ku, Osaka City, Osaka
Founded	February 1916
Established	February 1944
Capital fund	4,829,782,512 yen
Representatives	Chairperson, Representative Director: Junko Fukada President, Representative Director: Aki Hashimoto
URL	https://www.stella-chemifa.co.jp/

◆ Sales office

Osaka Sales Department	Meiji Yasuda Seimei Osaka Midosuji Bldg. 10F, 4-1-1 Fushimi-machi, Chuo-ku, Osaka City, 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 City, Osaka
Izumi Factory	1-41 Rinkai-cho, Izumiotsu City, Osaka
Kitakyushu Factory	1-1 Kurosakishiroishi, Yahatanishi-ku, Kitakyushu City, Fukuoka

<List of Affiliated Companies>

Base	Logo	Corporate Name	Business Segment	Head Office:
At home		STELLA CHEMIFA CORPORATION	High-purity Chemical Business	Chuo-ku, Osaka City, Osaka
		Blue Express, Inc.	Transportation Business	Sakai-ku, Sakai City, Osaka
		Blue Auto Trust Co., Ltd.	Other Business	Sakai-ku, Sakai City, Osaka
		Stella Pharma Corporation	Medical Business	Chuo-ku, Osaka City, Osaka
Abroad		STELLA CHEMIFA SINGAPORE PTE LTD	High-purity Chemical Business	Singapore
		STELLA EXPRESS 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

<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 and new products
- Result and Forecast of world semiconductor market scale by product
- Development of a new memory market
- Maintenance and Strengthening of Quality Edge
- Change of shipping volume of high-purity hydrofluoric acid (semiconductors and LCDs)
- Boosting Production of Semiconductor Chemicals

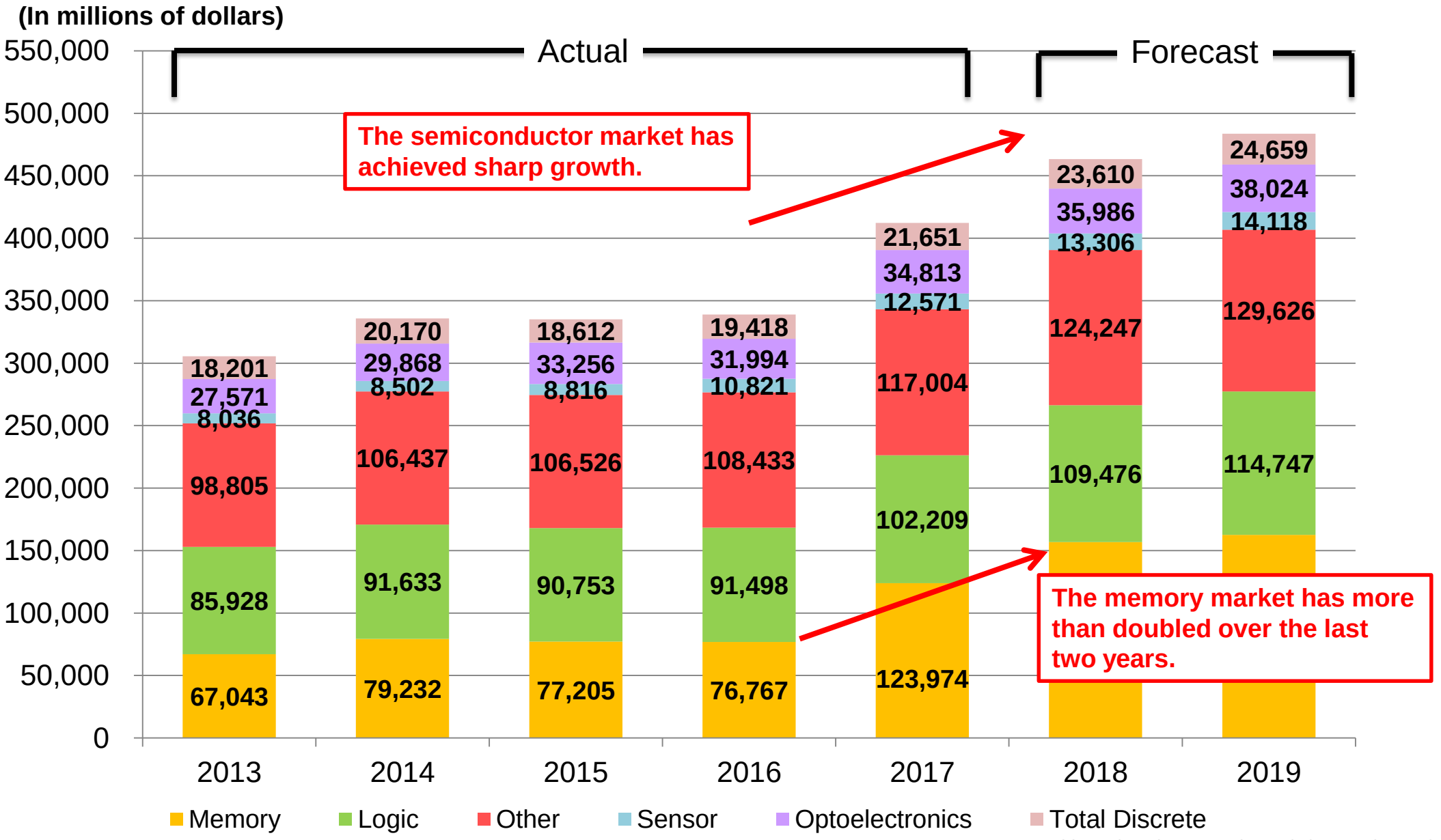
<Features of Our Products and New Products>

(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) Products Lineups are readied to respond the customer requirements, including like suppression of adhering particles, and 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	An ultra-high-purity chemical used for wet cleaning of silicon wafers in manufacturing semiconductors, FPDs, solar batteries, and MEMS
LL HF	HF with various functionalities made possible by adding a surfactant. It is mainly used for cleaning silicon wafers.
Ultra-high-purity buffered hydrofluoric acid	A chemical mixed with 50% hydrofluoric acid and 40% ammonium fluoride solutions
LL BHF	BHF with various functionalities made possible by adding a surfactant
LAL BHF	BHF that contains an additive has enabled it to achieve extended service life and given other advantages by optimizing the concentration of ammonium fluoride at 15% to 25%, about half the concentration of ammonium fluoride contained in conventional BHF.
Ex-LAL BHF	BHF containing an environmentally friendly additive with a maximum ammonium fluoride concentration of 5%
HSN Series	An etchant for silicon nitride with selectivity to silicon oxide, which is mainly used in the DRAM manufacturing process
LPL BHF	A silicon oxide etchant with minimum damage to silicon or polysilicon film

<Result and Forecast of World Semiconductor Market Scale by Product>



Source: World Semiconductor Trade Statistics Inc. (WSTS)

<Development of New Memory Market>

Manufacturer	Place of construction	Base name	Produced item	Wafer size	Production capacity, etc.	Plan
Samsung Electronics	**Xian**	17 lines (II)	3D-NAND	12 inches	120,000 wafers/month	Second factory under construction. Slated to go into operation around June 2019.
	Pyeongtaek	18 lines	3D-NAND	12 inches	130,000 wafers/month	Phase 2 under construction. Start of operation is not yet scheduled.
SK Hynix	**Wuxi**	C2F	DRAM	12 inches	140,000 wafers/month	Mass production to start in January 2019
	Cheongju	M15	3D-NAND	12 inches	50,000 wafers/month	Went into operation in October 2018
		M16	DRAM	12 inches		Scheduled to go into operation in 2020
Toshiba Memory	**Yokkaichi**	N-Y2	3D-NAND	12 inches	100,000 wafers/month	Utilization rate is being upped.
		Y6II	3D-NAND	12 inches		Production started in September 2018.
	Iwate	K1	3D-NAND	12 inches		Under construction. Scheduled to go into operation in the first half of 2019.
Intel	**Dalian**	Fab 2	3D-NAND	12 inches	160,000 wafers/month	For producing 3D NAND
Micron Technology	**Hiroshima**	Fab15	DRAM	12 inches	110,000 wafers/month	A new building under construction for the mass production of 1Xnm
Fujian Electronics & Information; JHICC *Technology licensed by UMC	**Quanzhou**		Nitch DRAM	12 inches	200,000 wafers/month	Mass production to start in 2019 Slightly behind schedule
Innotron Memory	**Hefei**	Phase1	DRAM	12 inches	125,000 wafers/month	Started producing prototypes in FY 2018
Yangtze River Storage Technology (YRST); YMTC *Tsinghua Unigroup acquired capital in XMC.	**Chengdu**	Phase1	3D-NAND	12 inches	50,000 wafers/month	200,000 wafers/month in 2020; 1,000,000 wafers/month in 2030

Large-scale investments are being made in memory factories mainly in China.

Source: STELLA CHEMIFA

Demand for memory is expected to grow in step with the advancement of the Internet and widespread use of IoT and artificial intelligence (AI).

We pursue the sales to the memory market with active strategies.

<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*** Succeeded in ultra-high-purity
Management size of particle	*0.2/0.1 um*	*0.05 um*	***0.03 um***

Further strengthening particle management

with introducing the World's most advanced analytical instruments.

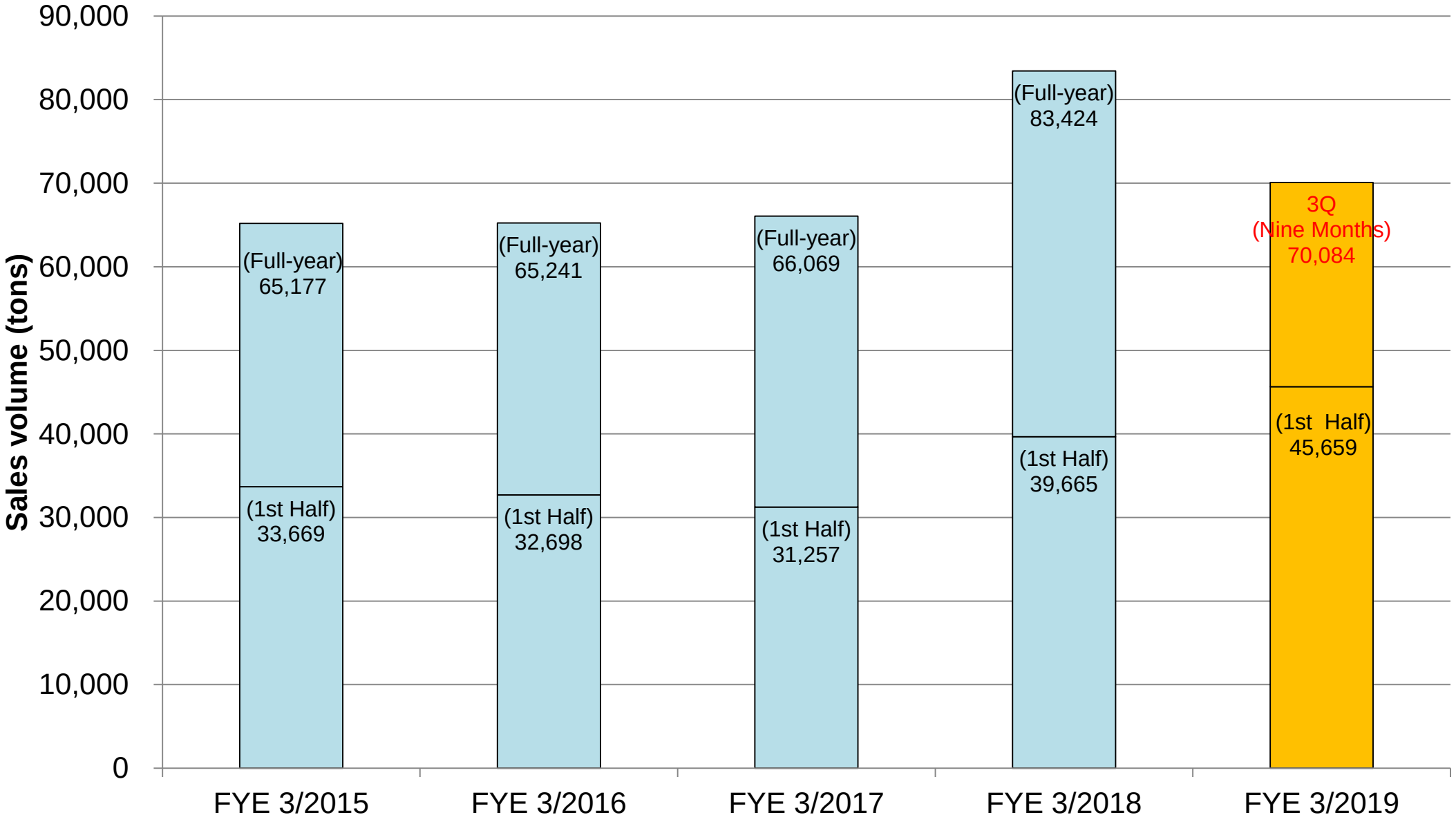
©RION CO., LTD.

Liquid-borne particle counter

©Thermo Fisher Scientific K. K.

High Resolution ICP-MS
(High resolution ICP-MS)

<Change of Shipping Volume of High-Purity Hydrofluoric Acid (Semiconductors and LCDs)>



<Boosting Production of Semiconductor Chemicals>

The shipping volume of 83,424 t in FYE 3/2018 is the largest figure ever achieved.

The shipping volume in FYE 3/2019 is expected to be 90,000 t.

To expand our share and strengthen the stable supply system

Establishment of the system that makes it possible to supply 100,000 t/year in FYE 3/2019

Batteries

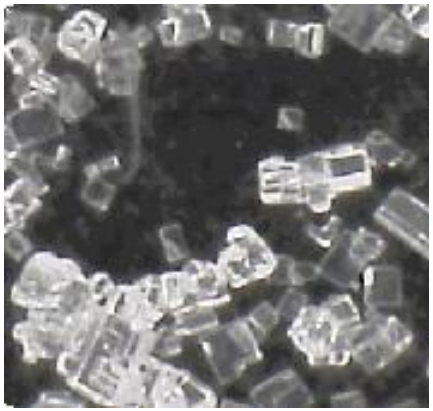
- Features of Our Products
- Electrolyte Business for Lithium-ion Secondary Batteries in China
- Global Market for Lithium-Ion Secondary Batteries (LIB)
- Approaches of Countries toward Automobile Businesses
- Electric Car Market Forecast
- Additives for Lithium-Ion Secondary Batteries

<Features of Our Products>

(1) Used as main material comprising the lithium-ion secondary batteries and commercialized 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 tetrafluoroborate	Electrolyte and additives for lithium-ion primary and secondary batteries
Additive for batteries	Additives for lithium-Ion secondary batteries



<Lithium hexafluorophosphate particle form>

<Lithium tetrafluoroborate>

<Large-size container: 1 m^3>

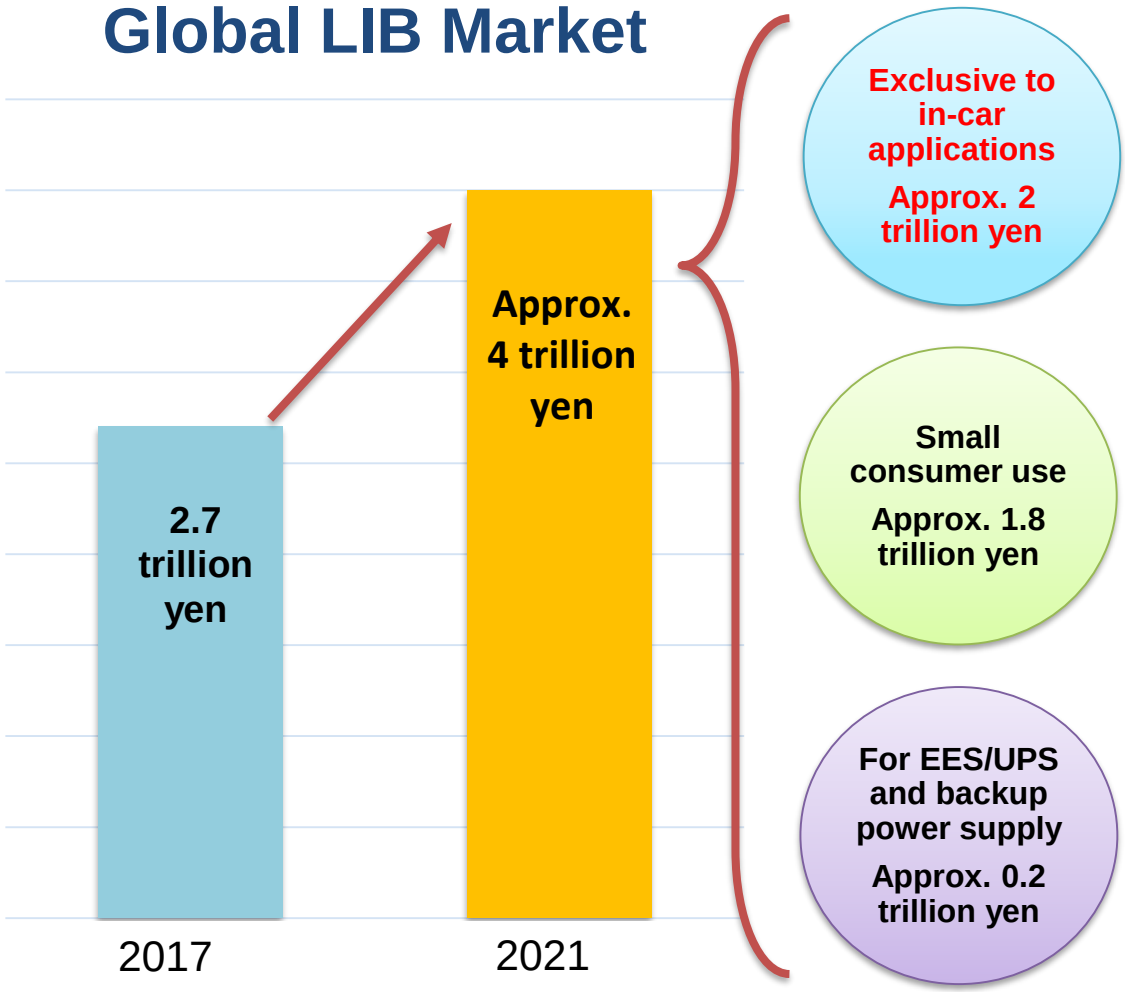
<Electrolyte Business for Lithium-Ion Secondary Batteries in China>

- Quzhou BDX New Chemical Materials Co., Ltd. (established in December 2015)
- Capital fund: 70 million Chinese yuan (STELLA CHEMIFA's stake: 25%)
- Some of the facilities used to manufacture electrolytes for lithium-ion secondary batteries were relocated to this joint venture company.
  The joint venture company uses the relocated facilities to produce electrolytes for lithium-ion secondary batteries and sells them in and outside China.

<Progress>

- June 2017 Started operation of manufacturing facilities (Maximum production capacity: 1,300 t/year)
- 2018 Started selling products

<Global Market for Lithium-Ion Secondary Batteries (LIB)>



Exclusive to in-car applications
Approx. 2 trillion yen

Small consumer use
Approx. 1.8 trillion yen

For EES/UPS and backup power supply
Approx. 0.2 trillion yen

Demand for lithium-ion batteries exclusive to in-car applications is expected to grow further because of an increase in global demand for environment-friendly vehicles.

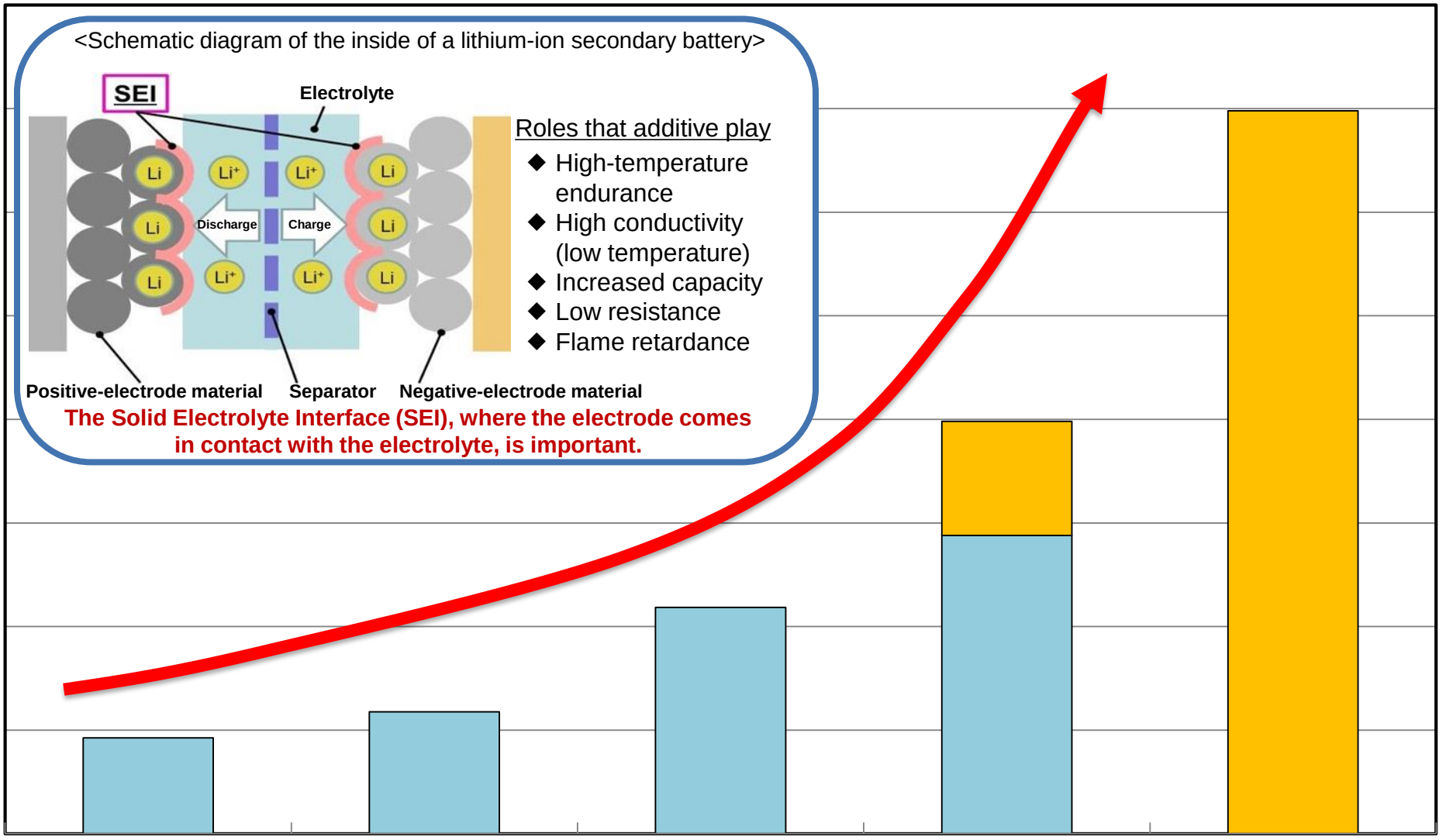
<Approaches of Countries toward Automobile Businesses>

Country/region	Course of action/policy
UK and France	The sale of gasoline and diesel-powered vehicles will be banned by 2040.
Norway and Netherlands	The sale of gasoline and diesel-powered vehicles will be banned from 2025.
China	It is required that new energy vehicles (NEV) account for at least 10% of the automobiles to be sold in China in 2019.
India	Total ban on the sale of gasoline and diesel-powered vehicles will be imposed to limit all automobiles sold in India to electric vehicles by 2030.
U.S. (California)	A manufacturer selling more automobiles than the number specified by the state must sell zero-emission vehicles (ZEV) at a fixed proportion of the total number of vehicles sold.

Electric vehicles (EV) will account for approximately 54% of all automobiles sold by 2040.
Electric vehicles including plug-in hybrid vehicles (PHV) are projected to account for over 90% of all automobiles sold.

Demand for automotive secondary batteries exclusive to in-car applications is expected to grow.

<Additives for Lithium-Ion Batteries>



GMP-related

- GMP(Good Manufacturing Practice)
- Oral Care-related: Tin fluoride (SnF2)

< GMP(Good Manufacturing Practice) >

The GMP inspection by USFDA for tin fluoride, an active ingredient of OTC anticaries drugs, was completed in November 2017.

Obtained official approval by a public organization in the US

Started selling GMP-certified products in 2018

Inside Izumi Factory (Izumiotsu City)

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"

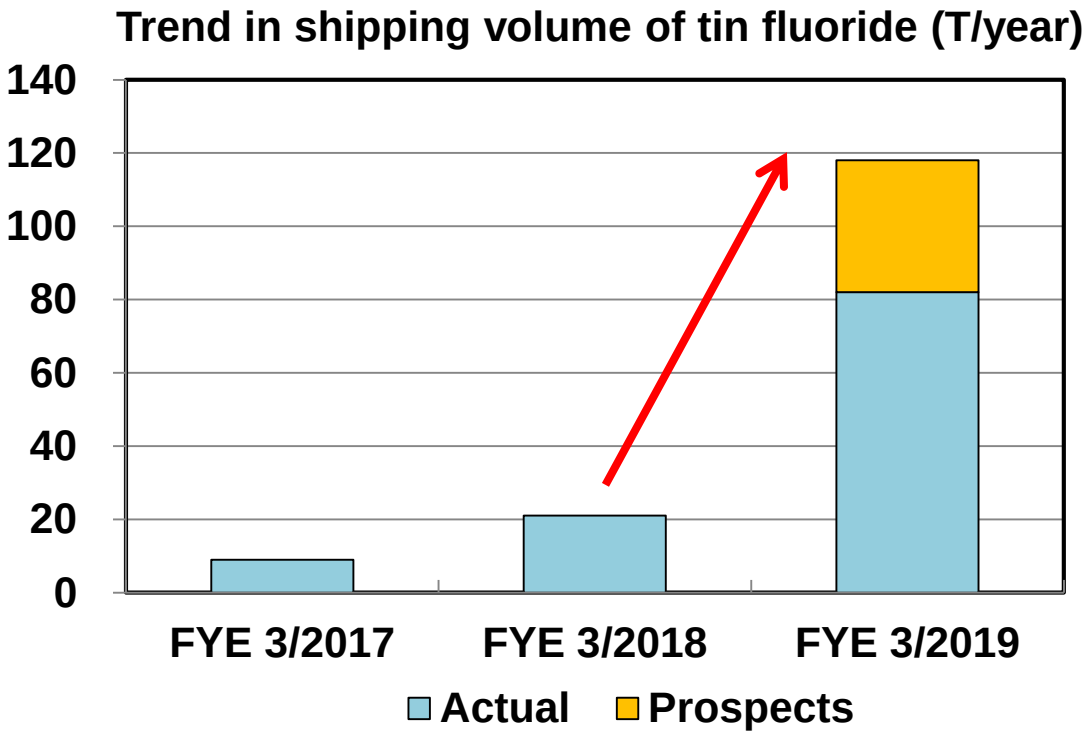
“Designing systems to assure high product quality"

<Oral Care-related: Tin Fluoride (SnF2)>

<Actions of fluorine on teeth>

- To suppress Streptococcus mutans from producing acid (Cavity prevention)
- To promote tooth remineralization
- To form acid-resistant teeth (to form fluorapatite)

We expect to see big demand mainly in Europe and the US, where there is strong interest in dental health and beauty.



4. Medical Business

- Corporate Profile (as of December 31, 2018)
- Development of New Radiotherapy Technology -BNCT-
- Establishment of Enrichment Technology/Features of Enriched Boron/Applications of Enriched Boron Compounds
- World's First Accelerator-based BNCT Clinical Trial
- Participation in Development of Imaging Diagnostic Technology -PET Diagnosis-
- Establishment of ^{18}FBPA-PET Development System

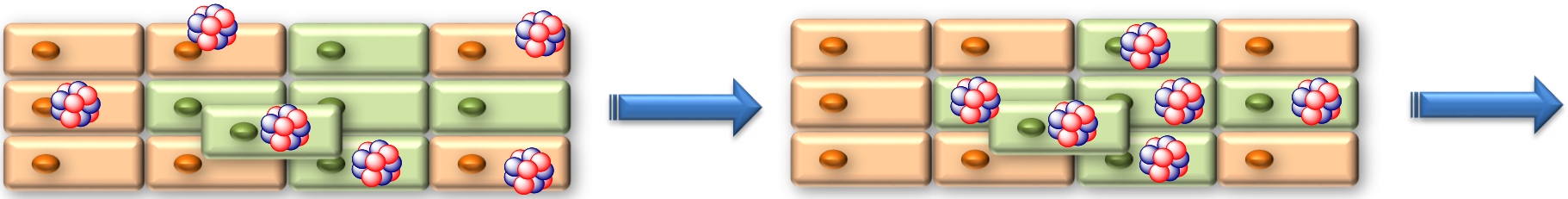
<Corporate Profile (as of December 31, 2018)>

Corporate name:	STELLA PHARMA CORPORATION
Head Office:	3-2-7 Koraibashi, Chuo-ku, Osaka City, Osaka
Representatives	Tomoyuki Asano, Representative Director and President
Established	June 2007
Capital fund	1.9 billion yen
Business lineup	Research and development, manufacture and marketing, etc. of drugs and medical devices
Shareholders	STELLA CHEMIFA CORPORATION Innovation Network Corporation of Japan Sumitomo Heavy Industries, Ltd.
Research Center	Sakai Drug Discovery Research Center (Naka-ku, Sakai City, Osaka)

STELLA PHARMA

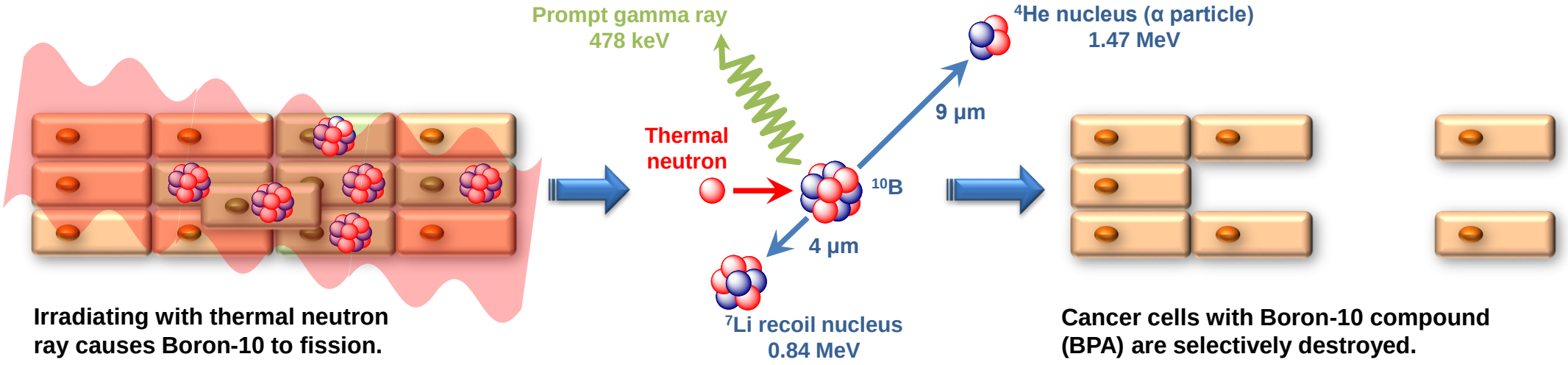
<Development of New Radiotherapy Technology -BNCT->

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



Administration of Boron-10 compound (BPA)

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



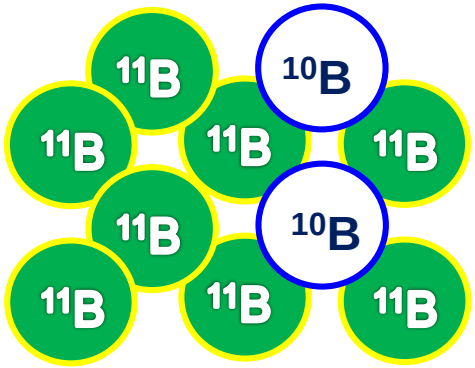
Irradiating with thermal neutron ray causes Boron-10 to fission.

Cancer cells with Boron-10 compound (BPA) are selectively destroyed.

<Establishment of Enrichment Technology/Features of Enriched Boron/ Applications of Enriched Boron Compounds>

▪ Establishment of enrichment technology

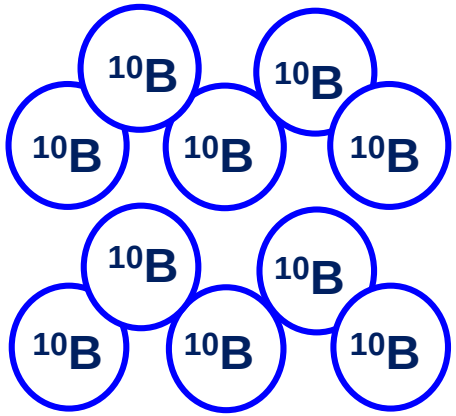
STELLA CHEMIFA established mass production technology of 10B for the first time in Japan.
In November 2000, the only enrichment plant in Japan was established.



Enrichment and separation

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

Generation



▪ Features of enriched boron

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

▪ Applications of Enriched Boron 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 dissolving into primary cooling water.
- **Cancer drug for boron neutron capture therapy (BNCT)**

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

The world's first clinical trials using the boron-based drug (SPM-011), developed by Stella Pharma, and the accelerator-based irradiation system (BNCT 30), developed by Sumitomo Heavy Industries, are on-going.

Phase II study for brain tumors

Having completed BNCT irradiation on all subjects slated for testing, we are now conducting an ongoing follow-up study. (As of the end of September 2018)

Phase II study for head and neck cancer

Having completed BNCT irradiation on all subjects slated for testing, we are now conducting an ongoing follow-up study. (As of the end of September 2018)

<<Flow chart of planned steps from clinical trial to approval application>>

Phase I study → **Phase II study** → **Approval application (scheduled)**

- Phase I study: Neutron dose is increased stepwise to check safety.
- Phase II study: Verification of the effect at the determined dose.

SPM-011 and BNCT30 were designated as the products subject to the MHLW Prioritized Review System for innovative medicines "SAKIGAKE" in 2017.
This allows the drug and device to be given priority in the consultation and review process for approval, and hence we undertake efforts to speed up their development.

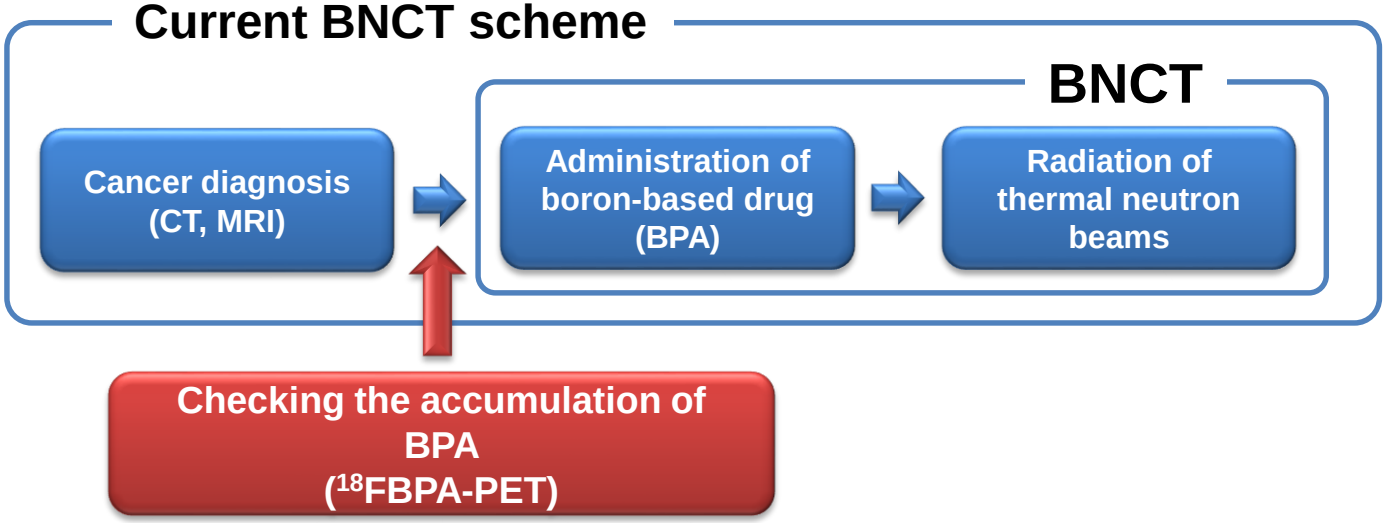
<Participation in the Development of Imaging Diagnostic Technology-PET Diagnosis->

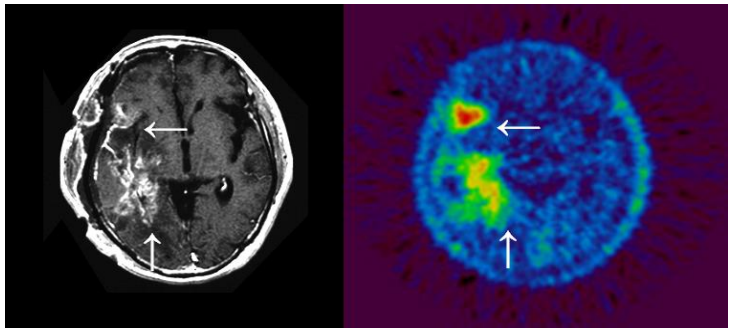
The "PET diagnosis" that attracts attention as a technology useful for the early detection of cancers
We have undertaken the development of ^{18}FBPA, which has been studied as a new drug to be used for the technology.

Features of ^{18}FBPA-PET

☆ **It is expected that ^{18}FBPA-PET contributes to the development of BNCT because the accumulation of the boron-based drug (BPA) against cancer can be checked beforehand (before treatment).**

Current BNCT scheme



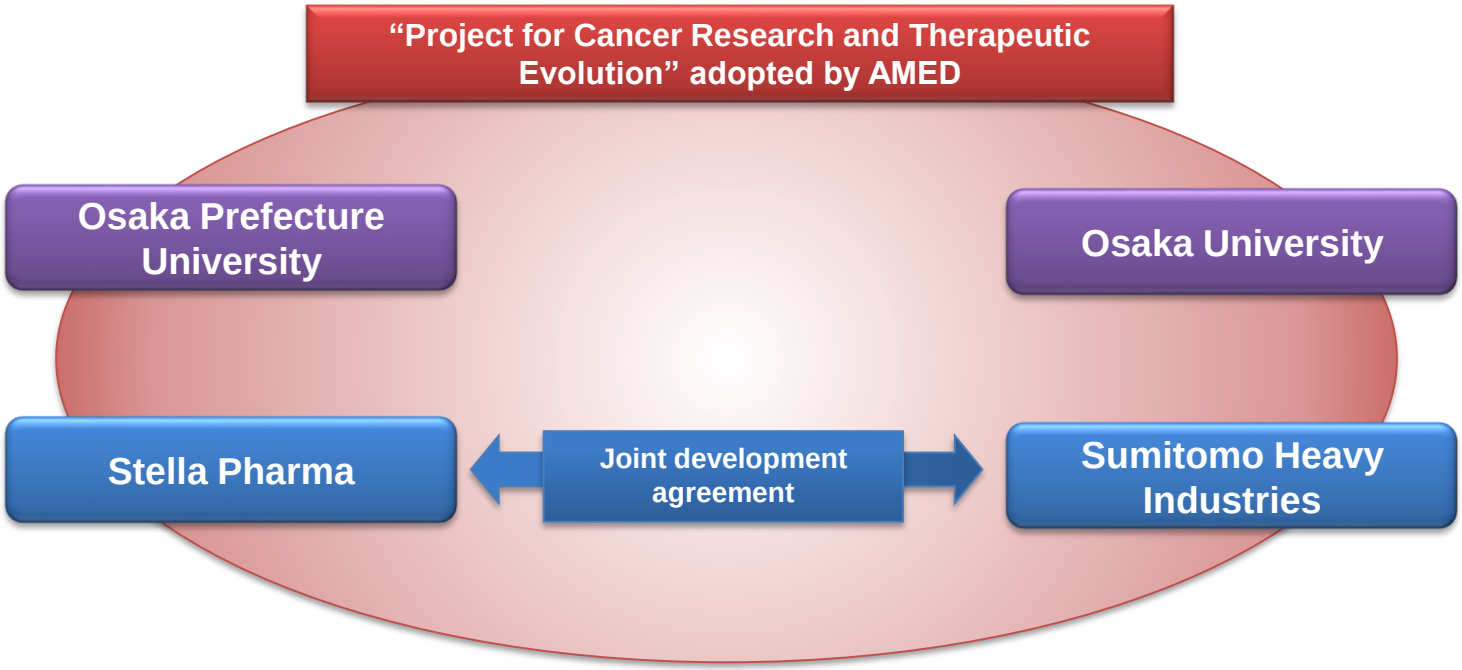


(Left) MRI image of brain tumors
(Right) ^{18}F-BPA PET image of brain tumors

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

<Establishment of ^{18}FBPA-PET Development System>

To implement this project, we have been conducting joint research with Osaka Prefecture University, Osaka University, and Sumitomo Heavy Industries through the following projects adopted by the Japan Agency for Medical Research and Development (AMED).
We have also been proceeding with the specific development of an automated synthesis equipment required for the commercialization jointly with Sumitomo Heavy Industries, Ltd.



5. Transportation Business

- Corporate Profile (as of December 31, 2018)
- Transportation System by Cooperation with Domestic Bases
- Overseas Bases
- International Intermodal Logistics System
- Future Activities

<Corporate Profile (as of December 31, 2018)>

Corporate name:	BLUE EXPRESS CORPORATION
Head Office:	10 Ohamanishi-machi, Sakai-ku, Sakai City, Osaka
Representatives	Kiyonori Saka, Representative Director and President
Established	June 1991
Capital fund	350 million yen
Business lineup	Common motor trucking/International intermodal transport Warehousing/Customs-clearing/Sales, rental, and lease of containers, tanks, etc. Automobile maintenance services/Business related to life insurance and non-life insurance agencies, etc.
URL	http://www.blue-express.co.jp/

<Transportation System by Cooperation with Domestic Bases>

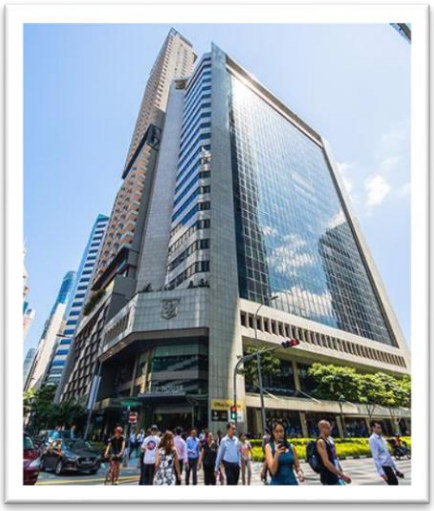
● Shipping terminals

Sendai Office
Kanto Office
Yokohama Office
Shimizu Office
Nagoya Office
Ohama Office
Kobe Office
Kitakyushu Office

★ Customs clearance sites

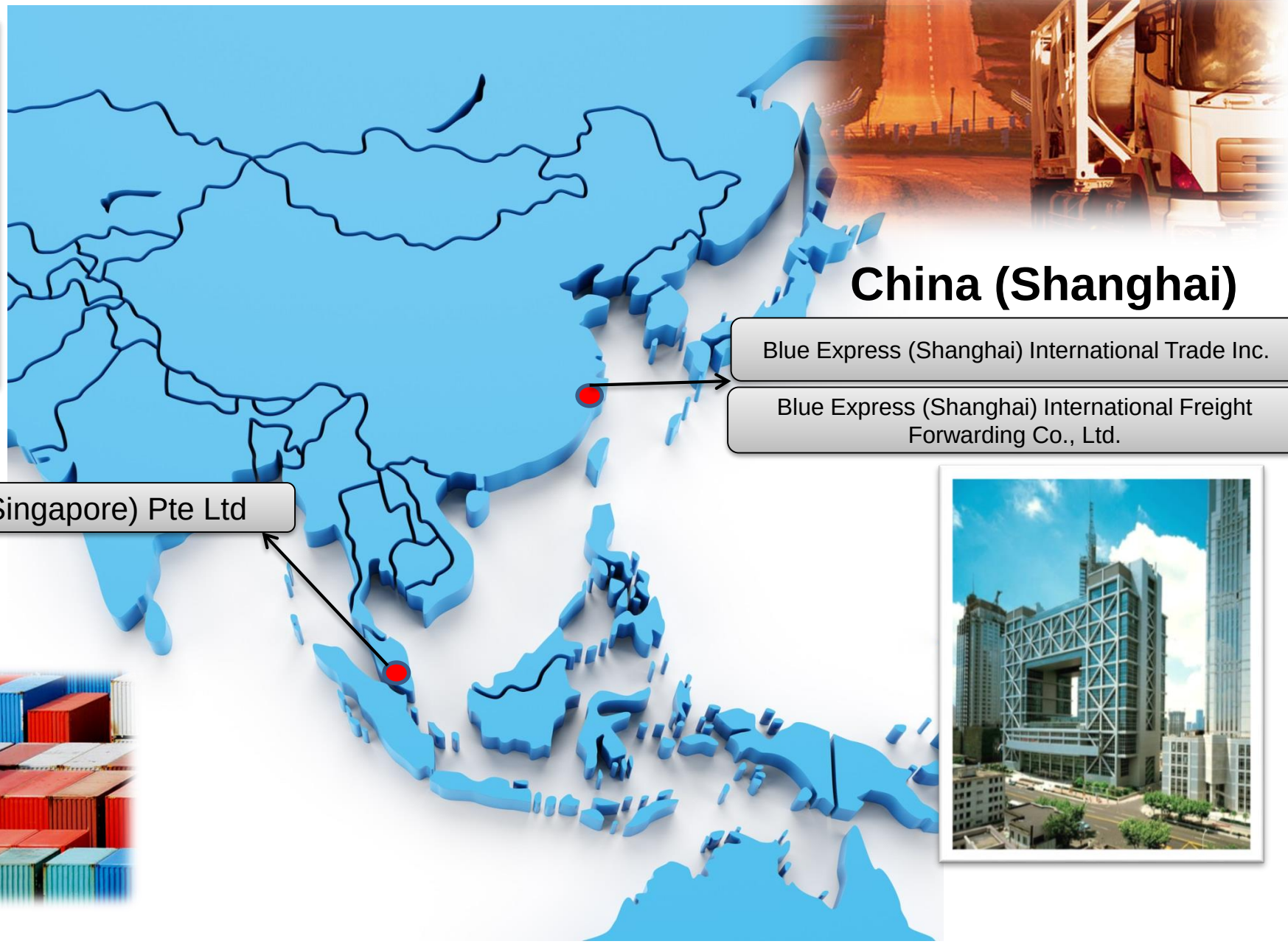
Yokohama Office
Osaka Office
Ohama Office

<Overseas Bases>



Singapore

Stella Express (Singapore) Pte Ltd



China (Shanghai)

Blue Express (Shanghai) International Trade Inc.

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

<International Intermodal Logistics System>

Transportation

Storage

- High-purity chemicals
- Hazardous materials
- General cargo, etc.
- Poisonous and deleterious substances
- High-pressure gas

Customs clearance

Container service

<Future Activities>

- To steadily expand business with first priority given to the improvement of customer satisfaction.

  Further quality improvement of international intermodal logistics service

- To maintain continuous investment for further growth
  - Currently building a new hazardous substance warehouse (scheduled to be completed in October 2018)
  - Consider rebuilding the Ohama Head office building (for effective use of the Ohama site)

- To further strengthen business operation base and revenue base
  - Promote compliance system and acquire human resources.
  - Enhance efficiency by integrating the Overseas Division's Tokyo and Yokohama offices into one location in Yokohama.
  - Build a new administrative building at the Sanpo Office and integrate the Transport Section into Sanpo to improve efficiency.

6. Future Activities

- Approaches to Advanced Energy Devices [1]
- Approaches to Advanced Energy Devices [2]
- Approaches to Advanced Energy Devices [3]
- Approaches to Advanced Energy Devices [4]
- Development of Fluoride Nanoparticles

<Approaches to Advanced Energy Devices [1]>

Lithium-ion batteries

a) Automotive applications

b) Residential applications

New additives for electrolytes of Lithium-ion batteries (LIBs)

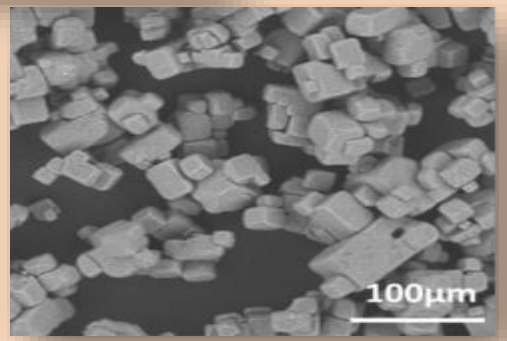
Continue user evaluation

<Approaches to Advanced Energy Devices [2]>

Next-generation secondary batteries

Appearance of sodium ion battery prototypes
(The above image is for illustration purposes only.)

Electrolyte for high-purity Sodium-ion batteries



Promotion of sample work

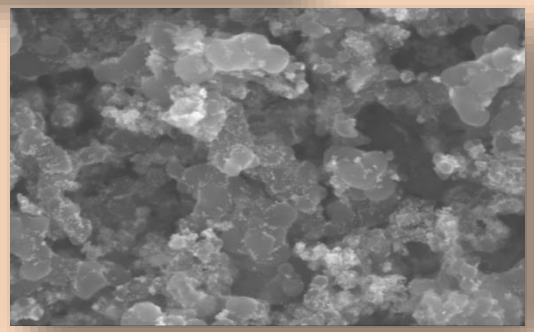
<Approaches to Advanced Energy Devices [3]>

Fuel cells

Fuel-cell vehicles

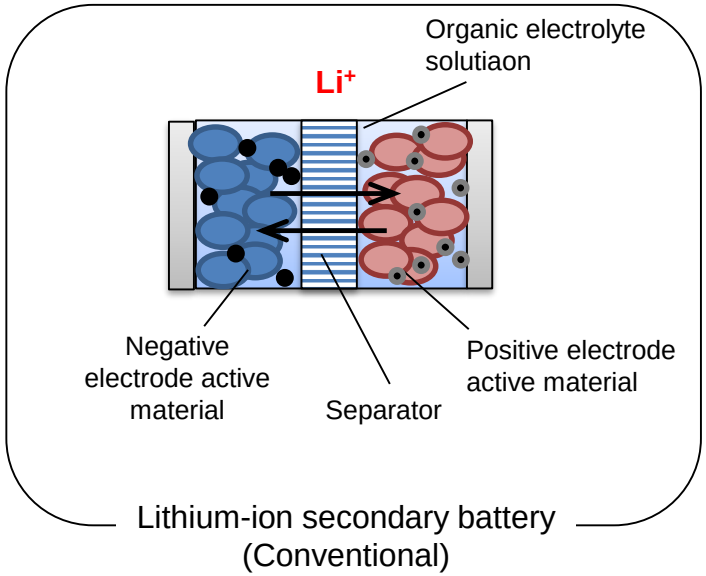
Residential units

Catalysts for high-performance fuel cells



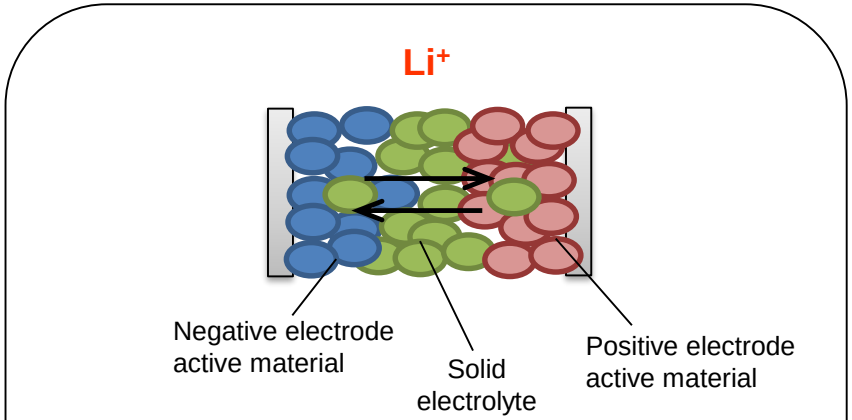
To start of PR

<Approaches to Advanced Energy Devices [4]>



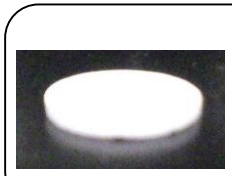
Lithium-ion secondary battery (Conventional)

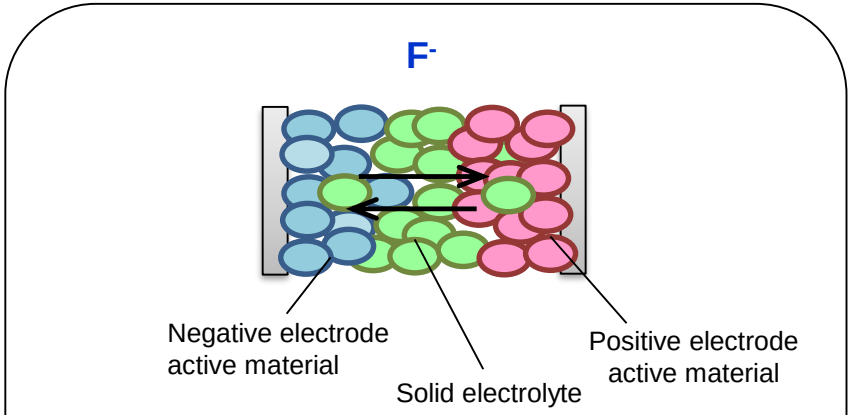
Make it all-solid state



All-solid-state LIB

Develop a material that will allow lithium ions to move smoothly at the electrode/electrolyte interface





All-solid-state FIB

Develop a material with high F-ion conductivity

<Development of Fluoride Nanoparticles>

Antireflection film

Heads-up display

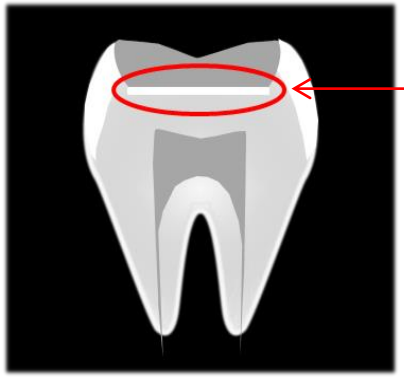
Navigation

Interior panels

An example of an expected automotive application for low refractive index **fluoride nanoparticles** would be an antireflective material for various in-car parts.

Oral care

Development of nano filler for dental composite resin



Dental X-ray image

A radiopaque fluoride nano filler makes it easy to identify the boundary of dentin.

Roll-out to the dental material market

Image of teeth using fluoride fillers

A fluoride nano filler that transmits visible light enables aesthetic dental treatments.

Fluoride Nanoparticles Dispersion

Samples of fluoride nanoparticles in powder form as well as in liquid form have been provided to customers for evaluation.

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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