Evolving unique chemical company

2012 Financial Results
- Consolidated -

SHOWA DENKO K.K.

February 15, 2013

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This presentation contains statements relating to management's projections of future profits and expectations for the Company's product development program. The Company cannot guarantee that these expectations and projections will be realized or correct. Please note that actual results may differ materially from the forecast due to a variety of factors, including changes in the market conditions. The timely commercialization of products under development by the Company may be disrupted or delayed by a variety of factors, including market acceptance, and the introduction of new products by competitors. The foregoing list of factors is not inclusive.

Consolidated Companies

- Consolidated subsidiaries: 38 (No new additions in this period)
  Excluded: 4 Thermal Technology Corporation of America
  Showa Aluminum (Thailand) Co., Ltd.
  Showa Aluminium Czech S.R.O.
  Grand Ocean-Showa Auto Air Conditioning (Dalian) Co., Ltd.
  (All excluded subsidiaries belonged to the Aluminum Segment: excluded as a result of the transfer of the automotive air-conditioner heat exchanger business)
- Equity method applied: 19
  Newly applied: 1 TS Opto Co., Ltd. (Electronics)

Selected Data

(Average)

	2011	Oct.-Dec.	2012	Oct.-Dec.	Increase/decrease	Oct.-Dec.
Exchange rate: ¥/US$	79.8	77.4	79.8	81.2	0.0	Yen depreciated by 3.8
Domestic naphtha price: ¥/kl	54,525	51,700	55,075	55,800	550	4,100
Aluminum LME price: US$/t	2,422	2,109	2,051	2,021	-371	-88

Exchange rate at 2011 year-end: ¥77.7/US$, 2012 year-end rate: ¥86.6/US$ ⇒Yen depreciated by ¥8.8/US$

Summary

2011 (Jan.1 – Dec.31) vs. 2012 (Jan.1 – Dec.31)

(Unit: Billions of Yen)

	2011	2012	Increase
Net Sales	854.2	739.8	-114.3
Operating Income	47.4	28.1	-19.2
Non-operating income and expenses	-7.3	-4.7	2.7
Interest/Dividend income less interest expenses	-4.3	-3.5	0.8
Equity in earnings or losses of affiliates	1.1	0.3	-0.8
Currency exchange gain or loss	-0.4	0.2	0.6
Other	-3.7	-1.6	2.1
Ordinary Income	40.0	23.4	-16.6
Extraordinary Profit	2.2	0.8	-1.4
Extraordinary Loss	-16.1	-13.0	3.2
Income before income taxes and minority interests	26.1	11.3	-14.8
Income Taxes	-6.4	-0.3	6.2
Income before minority interests	19.7	11.0	-8.6
Minority Interests in income	-2.7	-1.7	1.0
Net Income	17.0	9.4	-7.6
Net Income per share	¥11.35	¥6.26	¥-5.09

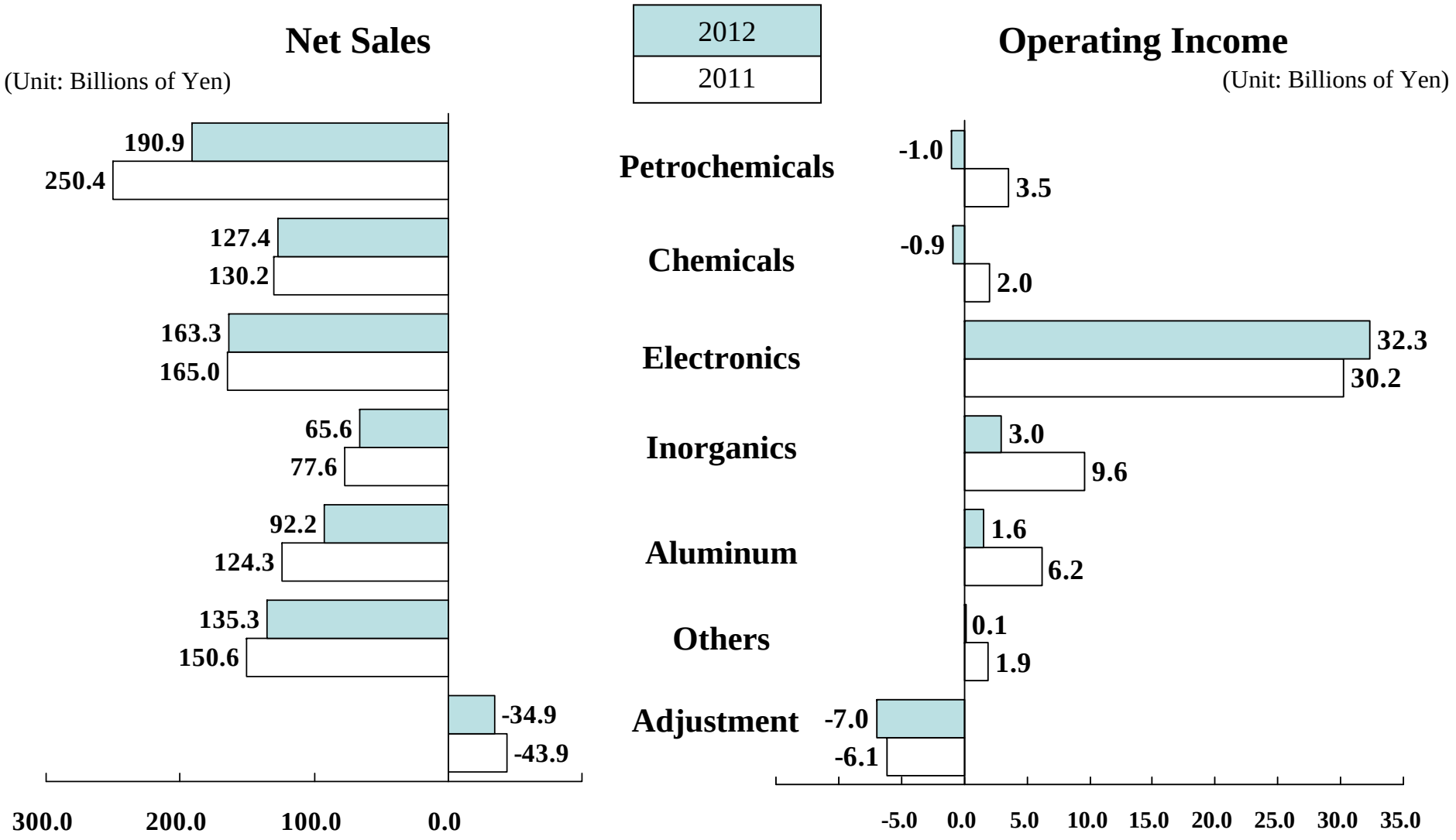
Cash dividends per Share	¥3.00	¥3.00(planned)	—

Extraordinary Profit/Loss

(Unit: Billions of Yen)

	2011	2012	Increase
■Extraordinary Profit	2.2	0.8	-1.4
●Gain on sales of noncurrent assets	0.6	0.2	-0.4
●Other	1.6	0.6	-1.0
■Extraordinary Loss	-16.1	-13.0	3.2
●Loss on sales and retirement of noncurrent assets	-2.0	-2.0	0.0
●Impairment loss	-4.6	-3.5	1.1
●Loss on valuation of investment securities	-0.5	-3.0	-2.5
●Loss on the Great East Japan Earthquake	-3.2	-	3.2
●Other	-5.8	-4.5	1.3
■Extraordinary Profit/Loss, Net	-13.9	-12.2	1.8

Sales and Operating Income by Segment



Consolidated Sales by Segment

(Unit: Billions of Yen)

	2011	2012	Increase/ decrease	
Petrochemicals	250.4	190.9	-59.5	Olefins: sales decreased (shipment volumes down due to problem with equipment that occurred in 1H, 2012, weakened supply and demand conditions) Organic chemicals: sales decreased (shipment volumes of vinyl acetate and ethyl acetate down)
Chemicals	130.2	127.4	-2.8	Functional polymers, industrial gases, electronic chemicals: sales maintained at the year-earlier level Basic chemicals: sales decreased (AN: shipment volumes down, weakened supply and demand conditions, decline of the market prices)
Electronics	165.0	163.3	-1.7	HDs：sales increased (shipment volumes up) Compound semiconductors: sales slightly increased (shipment volumes of GaN-based blue LEDs up) Rare earth: sales substantially decreased (shipment volumes down due to inventory adjustment in the magnet industry)
Inorganics	77.6	65.6	-12.0	Ceramics: sales decreased (shipment volumes for electronic applications down) Graphite electrodes: sales decreased (sales in the U.S. up, sales in Japan down due to lower shipment volumes for the Asian market)
Aluminum	124.3	92.2	-32.1	High-purity foils for capacitors, extrusions/specialty products: sales decreased (shipment volumes down) Heat exchangers: sales substantially decreased (The heat exchangers for automotive air conditioners business was transferred.) Shotic, aluminum cans: sales maintained at the year-earlier level
Others	150.6	135.3	-15.3	LIB materials: sales slightly decreased (shipment volumes for automotive applications down) SHOKO Co., Ltd.: sales decreased (sales of metals down)
Adjustment	-43.9	-34.9	9.0	
Total	854.2	739.8	-114.3	

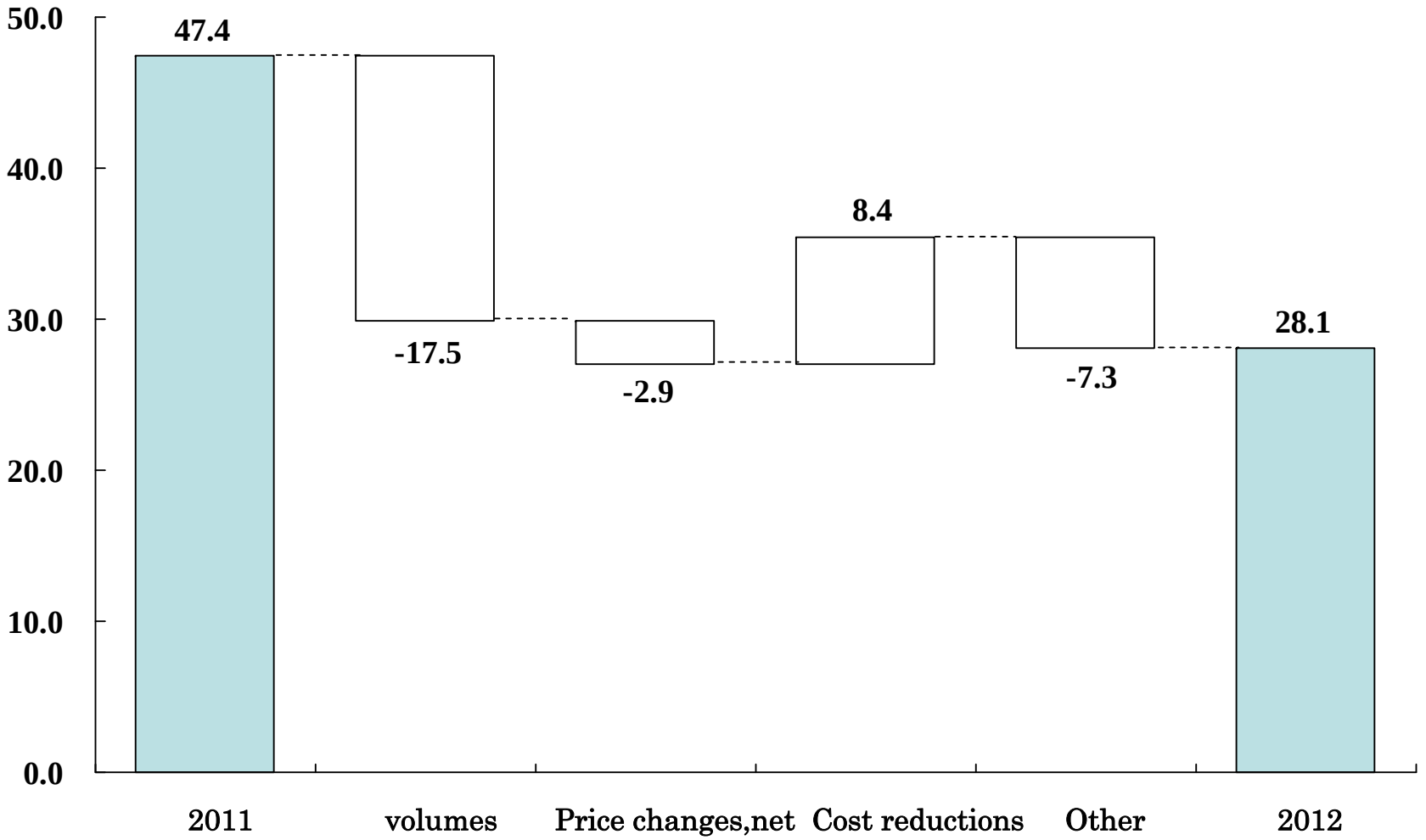
Consolidated Operating Income by Segment

(Unit: Billions of Yen)

	2011	2012	Increase/ decrease	
Petrochemicals	3.5	-1.0	-4.5	Olefins: profit decreased (shipment volumes down) Organic chemicals: profit decreased (shipment volumes of vinyl acetate and ethyl acetate down)
Chemicals	2.0	-0.9	-2.9	Functional polymers, electronic chemicals: profit maintained at the year-earlier level Industrial gases: profit decreased (shipment volumes down, cost up) Basic chemicals: profit decreased (AN: shipment volumes down, weakened supply and demand conditions, decline of the market prices)
Electronics	30.2	32.3	2.1	HDs: profit increased (shipment volumes up) Compound semiconductors: profit decreased (shipment volumes of GaN-based blue LEDs up) Rare earth: profit substantially decreased (shipment volumes down)
Inorganics	9.6	3.0	-6.7	Ceramics: profit substantially decreased (shipment volumes for electronic applications down) Graphite electrodes: profit maintained at the year-earlier level
Aluminum	6.2	1.6	-4.6	High-purity foils for capacitors, extrusions/specialty products: profit decreased (shipment volumes down) Heat exchangers: profit decreased (The heat exchangers for automotive air conditioners business was transferred.) Shotic: profit maintained at the year-earlier level Aluminum cans: profit increased (cost reduction)
Others	1.9	0.1	-1.8	LIB materials: profit decreased (shipment volumes for automotive down) SHOKO Co., Ltd.: profit decreased (profit of metals down)
Adjustment	-6.1	-7.0	-0.9	
Total	47.4	28.1	-19.2	

Operating Income Breakdown by Factor

(Unit: Billions of Yen)



Consolidated Balance Sheet

(Unit: Billions of Yen)

Assets	Dec.31, 2011	Dec.31, 2012	Increase/ decrease	Liabilities and Shareholders' Equity	Dec.31, 2011	Dec.31, 2012	Increase/ decrease
Cash and deposits	55.2	51.6	-3.6	Notes and accounts payable	117.2	107.2	-9.9
Notes and accounts receivable	139.4	138.2	-1.2	Interest-bearing debt	347.3	342.3	-5.0
Inventories	123.7	121.8	-2.0	Provision for retirement benefits	24.7	23.4	-1.3
Other current assets	29.6	30.6	0.9	Other liabilities	156.4	145.3	-11.1
Total Current Assets	347.9	342.1	-5.8	Total Liabilities	645.6	618.2	-27.4
Buildings and structures	84.2	81.6	-2.6	Capital stock	140.6	140.6	—
Machinery and equipment	123.5	115.2	-8.3	Capital surplus	62.2	62.2	0.0
Land	254.9	254.3	-0.6	Retained earnings	48.9	53.2	4.3
Other tangible fixed assets	19.8	22.2	2.4	Treasury stock	-0.1	-0.1	0.0
Tangible Fixed Assets	482.4	473.3	-9.1	Total Shareholders' equity	251.5	255.8	4.3
Intangible Fixed Assets	11.1	10.3	-0.8	Valuation difference on available-for-sale securities	-4.9	0.9	5.9
Investments and other assets	99.9	107.5	7.6	Foreign currency translation adjustment, Deferred hedge gains	-22.9	-12.0	10.8
Incl. Investment securities	59.6	67.8	8.2	Revaluation reserve for land	28.2	28.0	-0.2
				Total accumulated other comprehensive income	0.4	16.9	16.5
				Minority Interests	43.8	42.2	-1.6
Total fixed assets	593.4	591.1	-2.4	Total net assets	295.7	315.0	19.2
Total Assets	**941.3**	**933.2**	**-8.1**	**Total Liabilities and Net Assets**	**941.3**	**933.2**	**-8.1**

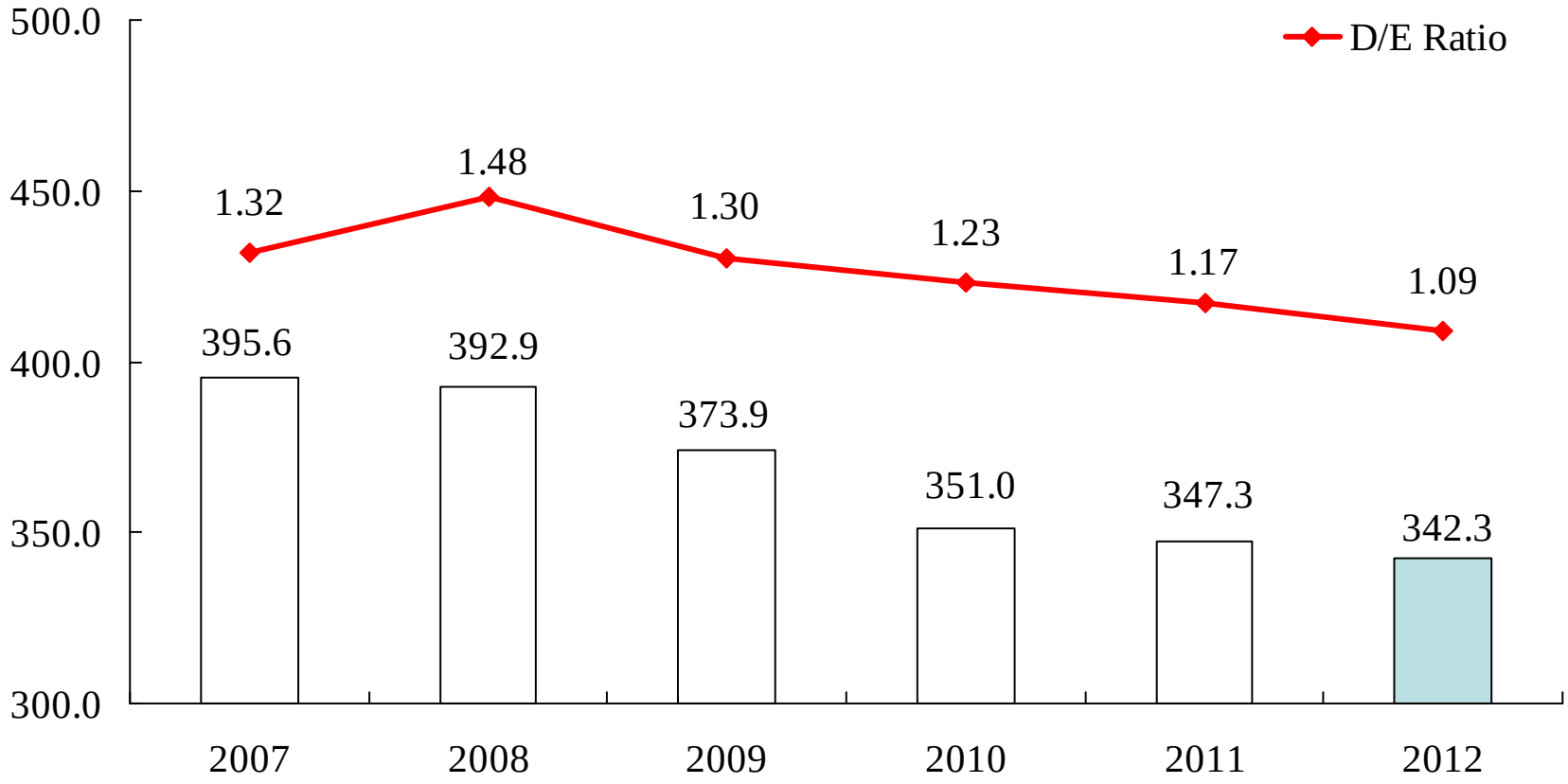
Total Assets
Interest-bearing Debt and D/E ratio

(Unit: Billions of Yen, times, %)

	Dec.31, 2011	Dec.31, 2012	Increase/ Decrease
● **Total assets**	941.3	933.2	-8.1
● **Interest-bearing debt**	347.3	342.3	-5.0
● **Debt/Equity ratio**	1.17times	1.09times	-0.08p
● **Stockholders' Equity ratio**	26.8%	29.2%	2.4p

Interest-bearing Debt

(Unit: Billions of Yen)



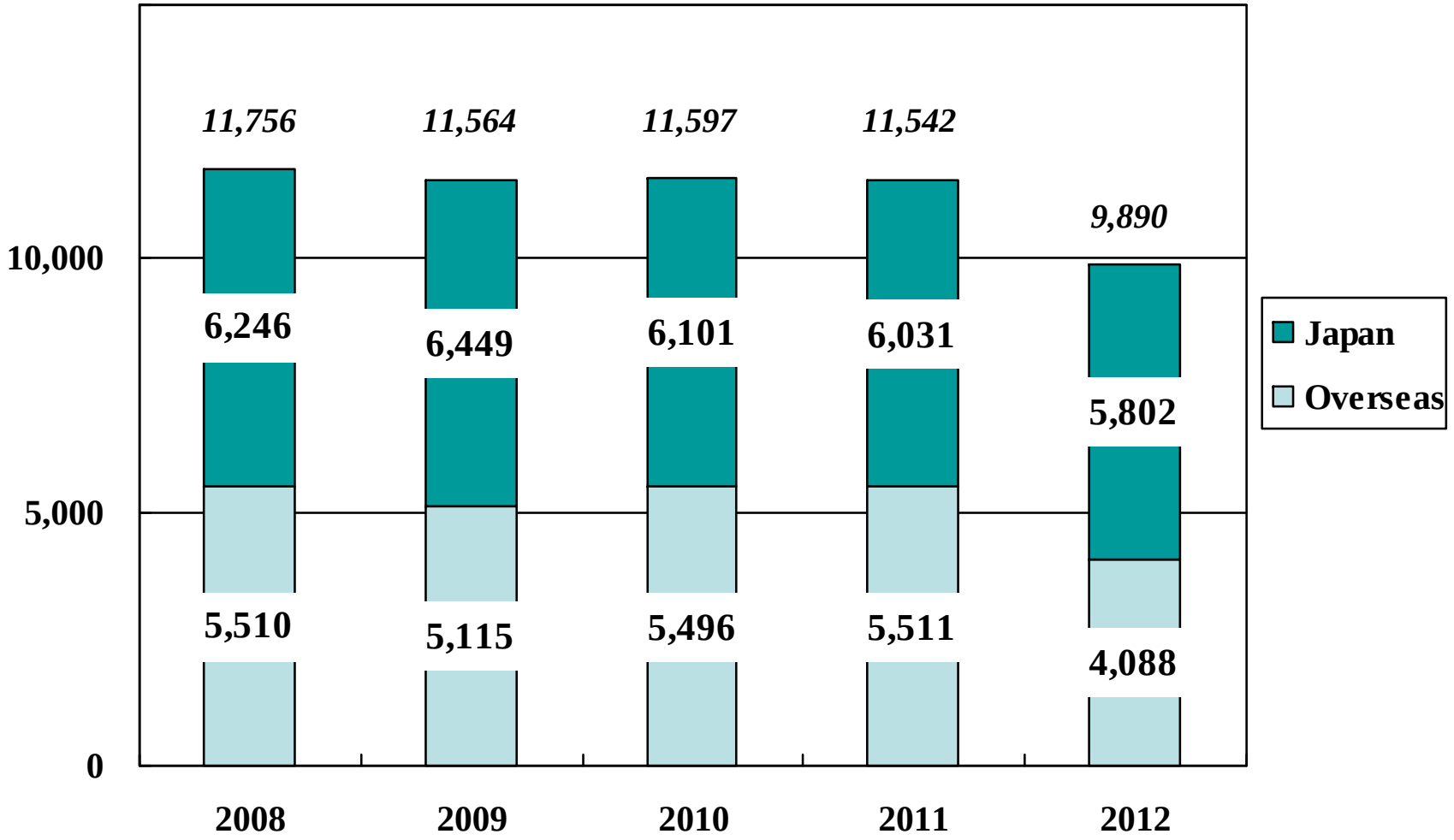
Equity ratio	26.9%	25.0%	25.5%	26.1%	26.8%	29.2%

Consolidated Cash Flows

(Unit: Billions of Yen)

	2011	2012	Increase/ Decrease
●CF from Operating Activities	69.4	53.3	-16.1
●CF from Investing Activities	-38.7	-40.2	-1.5
●Free CF	30.8	13.1	-17.7
●CF from Financing Activities	-17.3	-20.2	-2.9
●Others	-1.9	3.3	5.2
Increase of cash and equivalents	11.5	-3.8	-15.3

Total number of employees and breakdown by location



Japan	53.1%	55.8%	52.6%	52.3%	58.7%
Overseas	46.9%	44.2%	47.4%	47.7%	41.3%

Capital expenditures/ Depreciation by Segment

(Unit: Billions of Yen)

	2011		2012		Increase/Decrease	
	Capital expenditures	Depreciation	Capital expenditures	Depreciation	Capital expenditures	Depreciation
Petrochemicals	2.6	7.1	3.7	7.2	1.1	0.1
Chemicals	6.8	9.4	8.5	9.2	1.7	-0.3
Electronics	13.5	19.2	11.7	16.3	-1.8	-2.9
Inorganics	5.3	3.5	8.4	3.4	3.1	-0.1
Aluminum	5.4	6.9	4.3	6.1	-1.1	-0.8
Others	5.1	3.4	5.9	4.1	0.8	0.8
Total	38.8	49.4	42.5	46.2	3.7	-3.2

Selected Data 2012, 2013 Forecast (Consolidated)

(Unit: Billions of Yen)

	2011	2012	2012-2011 Increase/ Decrease	2013 Forecast	2013-2012 Increase/ Decrease
●Exchange rate: ¥/US$	80	80	0	83	Yen will depreciate by 3
●Domestic naphtha price: ¥/kl	54,525	55,075	550	56,000	925
●Aluminum LME price: US$/t	2,422	2,051	-371	2,100	49
●Interest-bearing debt	347.3	342.3	-5.0	350.0	7.7
●Interest/dividend income less interest expenses	-4.3	-3.5	0.8	-3.4	0.1
●R&D expenditures	21.6	20.6	-1.0	20.5	-0.1
●Number of employees	11,542	9,890	-1,652	10,783	893
●Total employment cost	75.3	70.6	-4.7	72.3	1.7

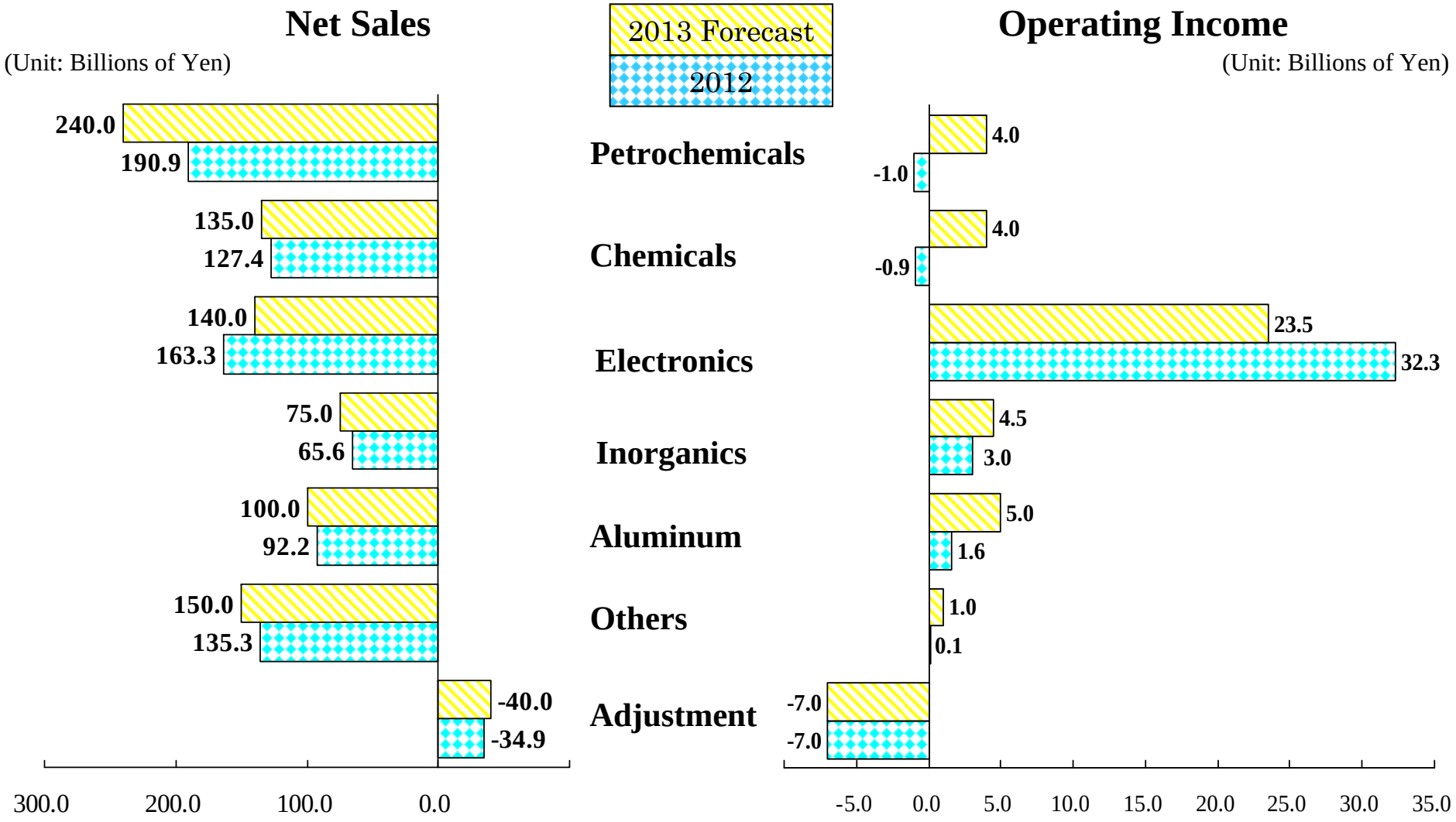
2013 Forecast (Consolidated)

(Unit: Billions of Yen except Cash dividends per Share and Net income per Share)

	2012	2013 Forecast	Increase
Net Sales	739.8	800.0	60.2
Operating Income	28.1	35.0	6.9
Interest/dividend income less interest expenses	-4.7	-5.0	-0.3
Ordinary Income	23.4	30.0	6.6
Extraordinary Profit	0.8	-5.5	6.7
Extraordinary Loss	-13.0		
Net Income	9.4	15.0	5.6
Net Income per Share	¥6.26	¥10.02	¥3.76

Cash dividends per Share	¥3.00(planned)	¥3.00	-

Sales and Operating Income
Forecast for 2013



Net Sales by Segment, 2013 Forecast (Consolidated)

(Unit: Billions of Yen)

	2012	2013 Forecast	Increase/ Decrease	Comments
Petrochemicals	190.9	240.0	49.1	Shipment volumes up (the problem with equipment that occurred in 2012 resolved)
Chemicals	127.4	135.0	7.6	Basic chemicals, electronic chemicals: sales increase expected (shipment volumes up)
Electronics	163.3	140.0	-23.3	HDs, rare earth: sales decrease expected Compound semiconductors: sales decrease expected (GaN-based blue LED business was transferred)
Inorganics	65.6	75.0	9.4	Ceramics: sales increase expected (shipment volumes up) Graphite electrodes: sales increase expected (Sales in the U.S.)
Aluminum	92.2	100.0	7.8	Rolled products, extrusions/specialty products: sales increase expected (Shipment volumes up)
Others	135.3	150.0	14.7	SHOKO Co., Ltd.: sales increase expected
Adjustment	-34.9	-40.0	-5.1	
Total	739.8	800.0	60.2	

Operating Income, 2013 Forecast (Consolidated)

(Unit: Billions of Yen)

	2012	2013 Forecast	Increase/ Decrease	Comments
Petrochemicals	-1.0	4.0	5.0	Shipment volumes up (the problem with equipment that occurred in 2012 resolved)
Chemicals	-0.9	4.0	4.9	Basic chemicals, electronic chemicals: profit increase expected (shipment volumes up) Cost reduction, depreciation decrease
Electronics	32.3	23.5	-8.8	HDs: profit decrease expected Rare earth: profit decrease expected (shipment volumes down)
Inorganics	3.0	4.5	1.5	Ceramics: profit increase expected (shipment volumes up) Graphite electrodes: profit decrease expected (weakened supply and demand conditions of electric steel)
Aluminum	1.6	5.0	3.4	Rolled products: profit increase expected (Shipment volumes up) Depreciation decrease
Others	0.1	1.0	0.9	
Adjustment	-7.0	-7.0	0.0	
Total	28.1	35.0	6.9	

Consolidated Cash Flows, 2013 Forecast

(Unit: Billions of Yen)

	2012	2013 Forecast	Increase/ Decrease
●CF from Operating Activities	53.3	70.0	16.7
●CF from Investing Activities	-40.2	-60.0	-19.8
●Free CF	13.1	10.0	-3.1
●CF from Financing Activities	-20.2	-6.5	13.7
●Others	3.3	-	-3.3
Increase of cash and equivalents	-3.8	3.5	7.3

Capital expenditures/Depreciation by Segment
2013 Forecast

(Unit: Billions of Yen)

	2012		2013 Forecast		Increase/Decrease	
	Capital expenditures	Depreciation	Capital expenditures	Depreciation	Capital expenditures	Depreciation
Petrochemicals	3.7	7.2	2.6	6.5	-1.1	-0.7
Chemicals	8.5	9.2	6.5	7.0	-1.9	-2.2
Electronics	11.7	16.3	9.7	13.2	-2.0	-3.1
Inorganics	8.4	3.4	19.7	2.8	11.3	-0.6
Aluminum	4.3	6.1	5.5	4.5	1.2	-1.6
Others	5.9	4.1	7.4	4.3	1.5	0.2
Total	42.5	46.2	51.4	38.3	8.9	-8.0

(Reference) CQ4 Summary

CQ4 (Oct.1 – Dec.31), 2011 vs. CQ4 (Oct.1 – Dec.31), 2012

(Unit: Billions of Yen)

	CQ4, 2011	CQ4, 2012	Increase
Net Sales	212.5	192.9	-19.7
Operating Income	8.5	4.3	-4.2
Non-operating income and expense	-1.3	-0.6	0.7
Interest/Dividend income less expenses	-1.0	-0.8	0.2
Equity in earnings of affiliates	0.5	0.6	0.1
Foreign exchange gain or loss	0.3	0.7	0.4
Other	-1.1	-1.1	0.0
Ordinary Income	7.2	3.7	-3.5
Extraordinary Income	0.7	0.3	-0.4
Extraordinary Loss	-5.9	-5.3	0.6
Income before income taxes and minority interests	2.0	-1.3	-3.3
Income Taxes	-2.0	-0.2	1.9
Income before minority interests	0.0	-1.5	-1.4
Minority Interests in income	-0.5	-0.4	0.1
Net Income	-0.5	-1.9	-1.3

(Reference) Consolidated Sales by Segment

CQ4 (Oct.1 – Dec.31), 2011 vs. CQ4 (Oct.1 – Dec.31), 2012

(Unit: Billions of Yen)

	CQ4 2011	CQ4 2012	Increase/ decrease	
Petrochemicals	59.3	59.5	0.2	Olefins: sales increased (price up) Organic chemicals: sales decreased (shipment volumes of ethyl acetate down)
Chemicals	32.3	32.9	0.6	Functional polymer materials, industrial gases, electronic chemicals: sales maintained at CQ4,2011 level Basic chemicals: sales increased (AN: price up, ammonia: shipment volumes up)
Electronics	44.4	36.0	-8.4	HDs：sales increased (shipment volumes up) Compound semiconductors: sales decreased (GaN-based blue LED business was transferred) Rare earth: sales substantially decreased (shipment volumes down)
Inorganics	18.7	16.5	-2.2	Ceramics: sales decreased (price down) Graphite electrodes: sales decreased (sales in the U.S. down due to lower shipment volumes, sales in Japan maintained at the year-earlier level)
Aluminum	29.9	22.3	-7.6	High-purity foils for capacitors, extrusions/specialty products: sales decreased (shipment volumes down) Heat exchangers: sales substantially decreased (the heat exchangers for automotive air conditioners business was transferred.) Shotic: sales decreased (price down) Aluminum cans: sales increased (shipment volumes up)
Others	37.4	33.9	-3.4	LIB materials: sales increased (shipment volumes up) SHOKO Co., Ltd. : sales decreased (sales of metals down)
Adjustment	-9.4	-8.3	1.1	
Total	212.5	192.9	-19.7	

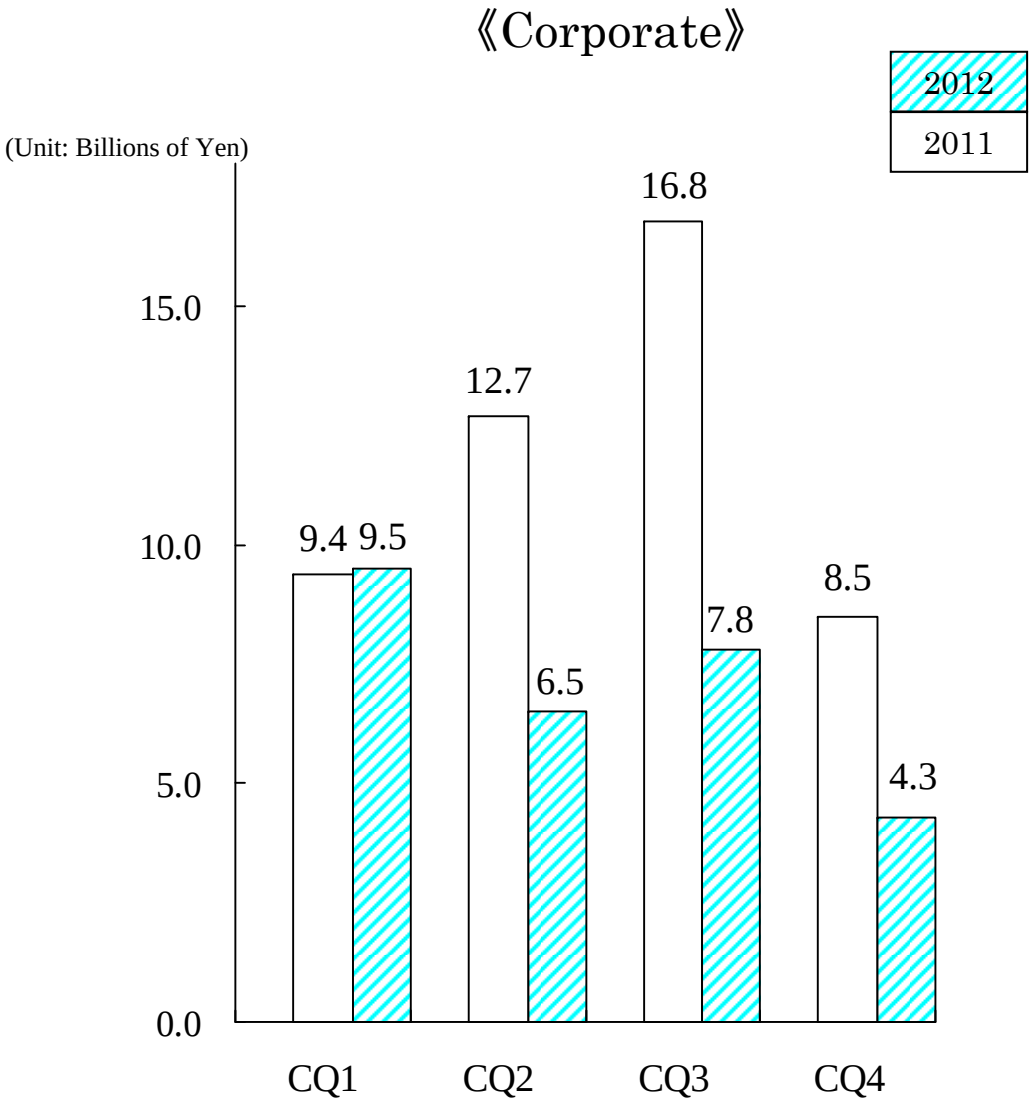
(Reference) Consolidated Operating Income by Segment

CQ4 (Oct.1 – Dec.31), 2011 vs. CQ4 (Oct.1 – Dec.31), 2012

(Unit: Billions of Yen)

	CQ4 2011	CQ4 2012	Increase/ decrease	
Petrochemicals	-1.6	1.2	2.8	Olefins: profit increased (price up) Organic chemicals: profit slightly decreased (shipment volumes of ethyl acetate down)
Chemicals	-0.3	-0.6	-0.3	Functional polymer materials: profit slightly decreased Industrial gases: profit maintained at CQ4, 2011 level Basic chemicals: profit decreased (Chloroprene rubber: price down) Electronic chemicals: profit slightly increased
Electronics	10.2	5.9	-4.3	HDs: profit maintained at CQ4, 2011 level Compound semiconductors: profit increased (disappearance of the influence of the lower of cost or market method in CQ4,2011) Rare earth: profit substantially decreased (shipment volumes down)
Inorganics	1.5	0.1	-1.4	Ceramics: profit slightly decreased (price down) Graphite electrodes: profit maintained at CQ4, 2011 level
Aluminum	0.2	-0.1	-0.3	High-purity foils for capacitors: profit decreased (shipment volumes down) Extrusions/specialty products, *Shotic*: profit maintained at CQ4, 2011 level Heat exchangers: profit decreased (the heat exchangers for automotive air conditioners business was transferred.) Aluminum cans: profit increased (cost reduction)
Others	0.1	-0.1	-0.2	LIB materials: profit slightly decreased SHOKO Co., Ltd.: profit decreased (profit of metals down)
Adjustment	-1.6	-2.1	-0.5	
Total	8.5	4.3	-4.2	

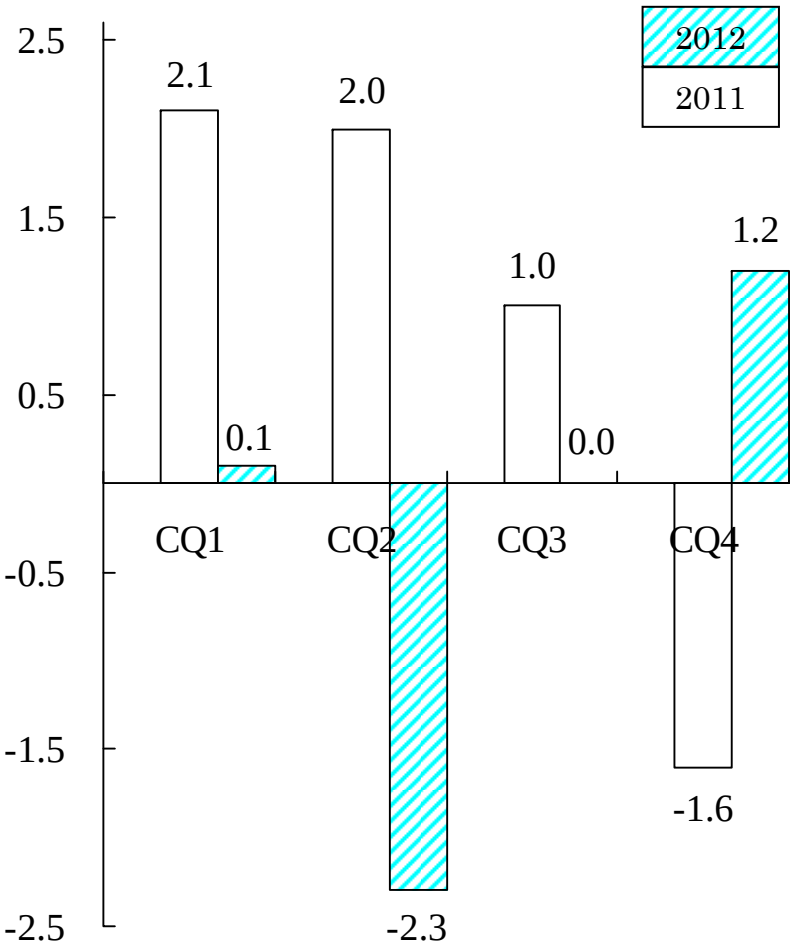
(Reference)　Quarterly Operating Income



(Reference) Quarterly Operating Income

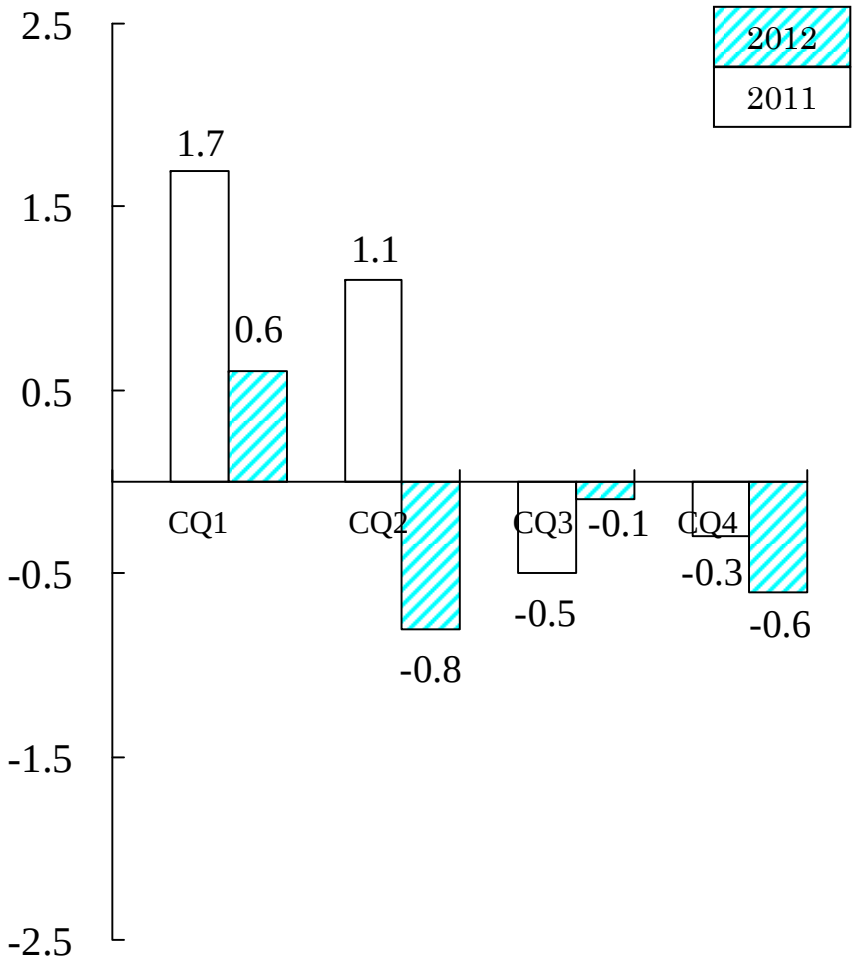
《Petrochemicals》

(Unit: Billions of Yen)



《Chemicals》

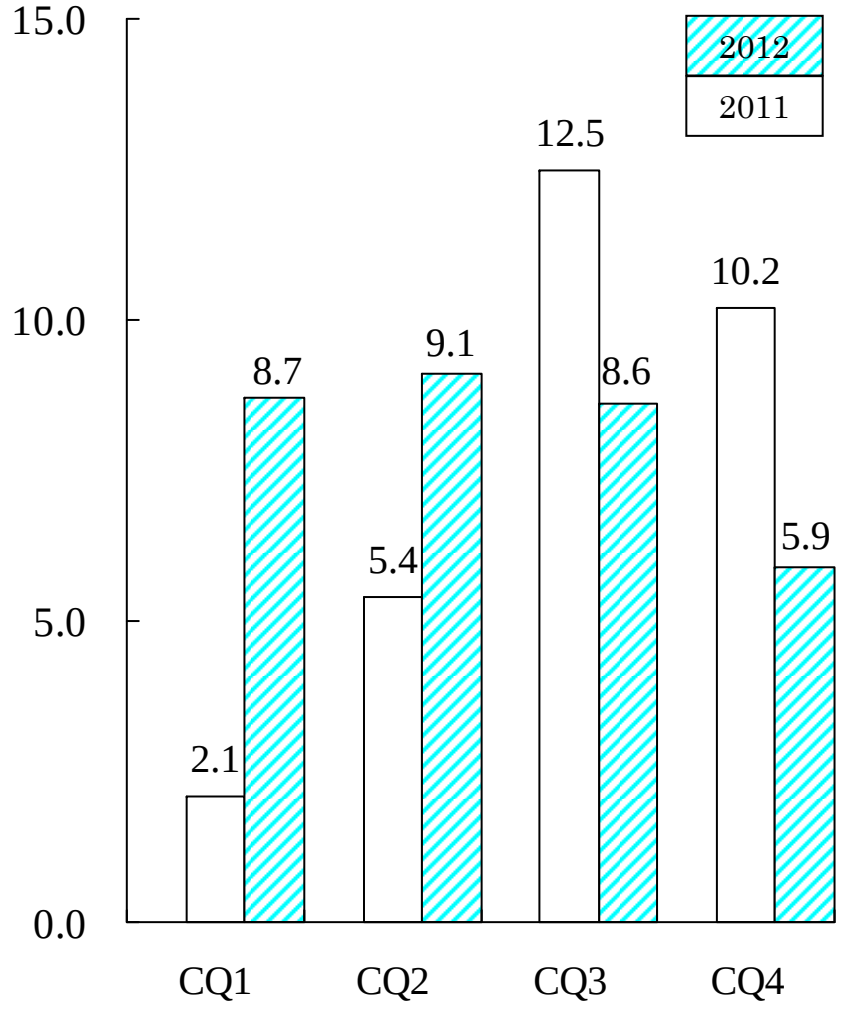
(Unit: Billions of Yen)



(Reference) Quarterly Operating Income

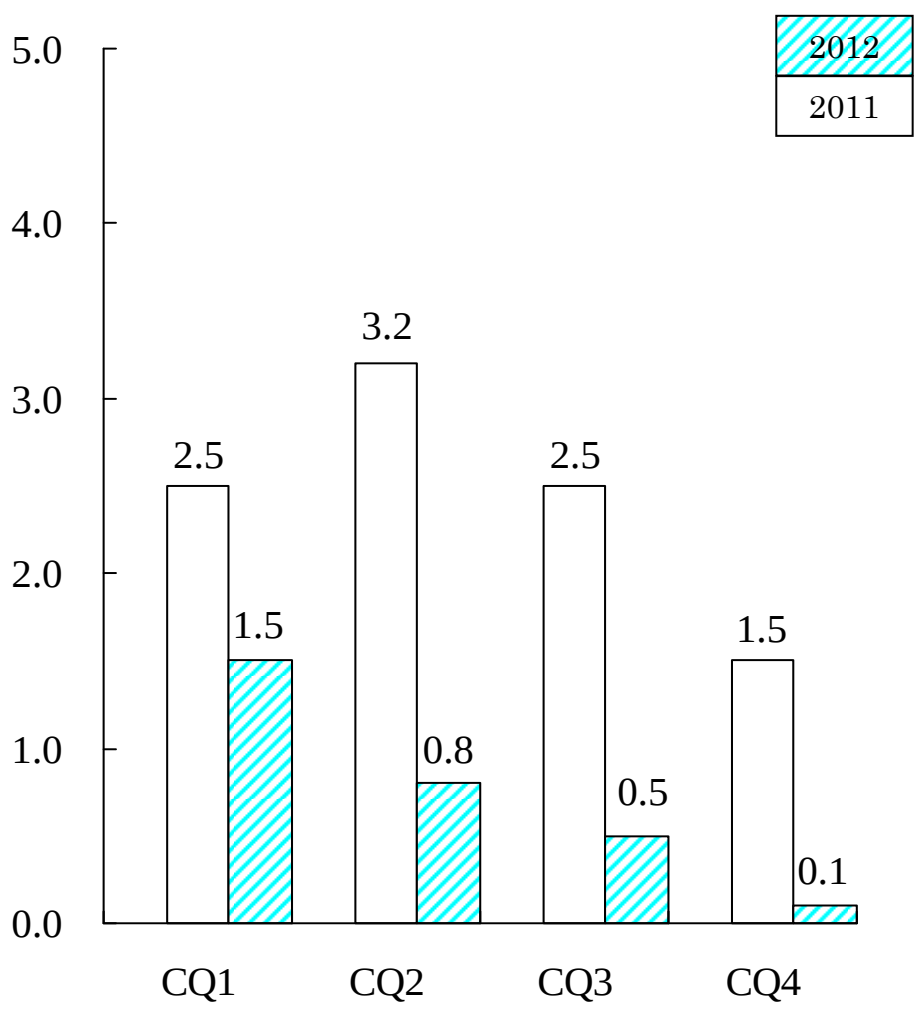
《Electronics》

(Unit: Billions of Yen)



《Inorganics》

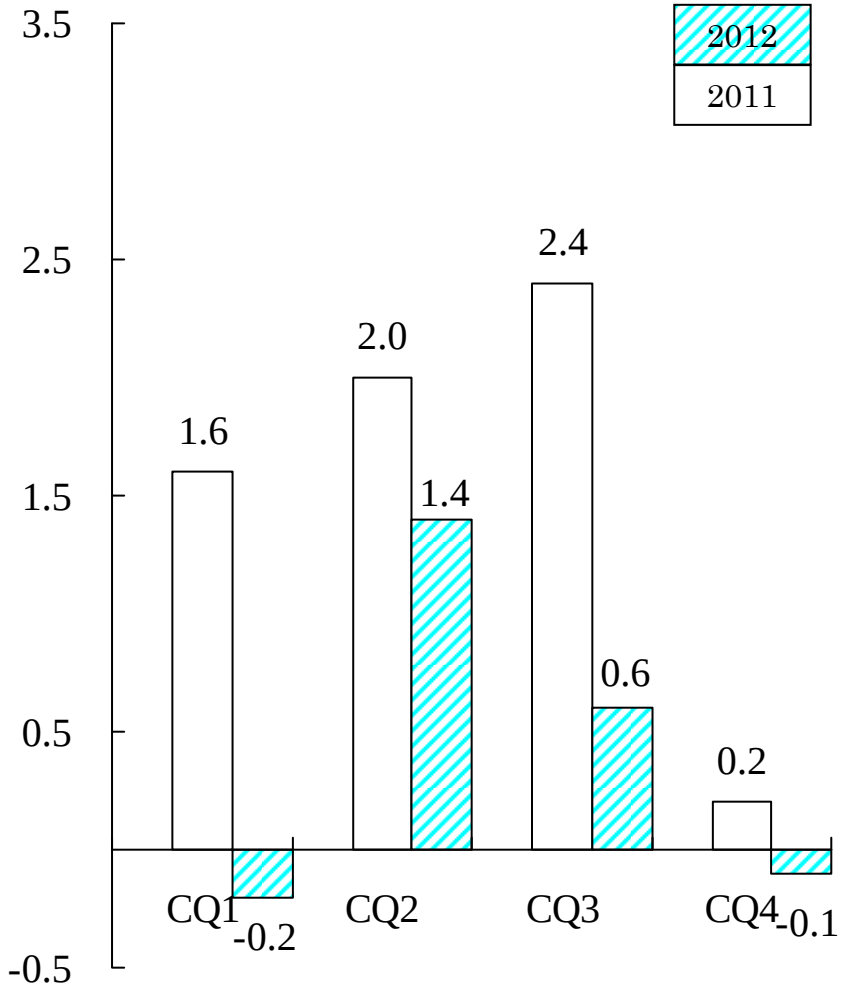
(Unit: Billions of Yen)



(Reference) Quarterly Operating Income

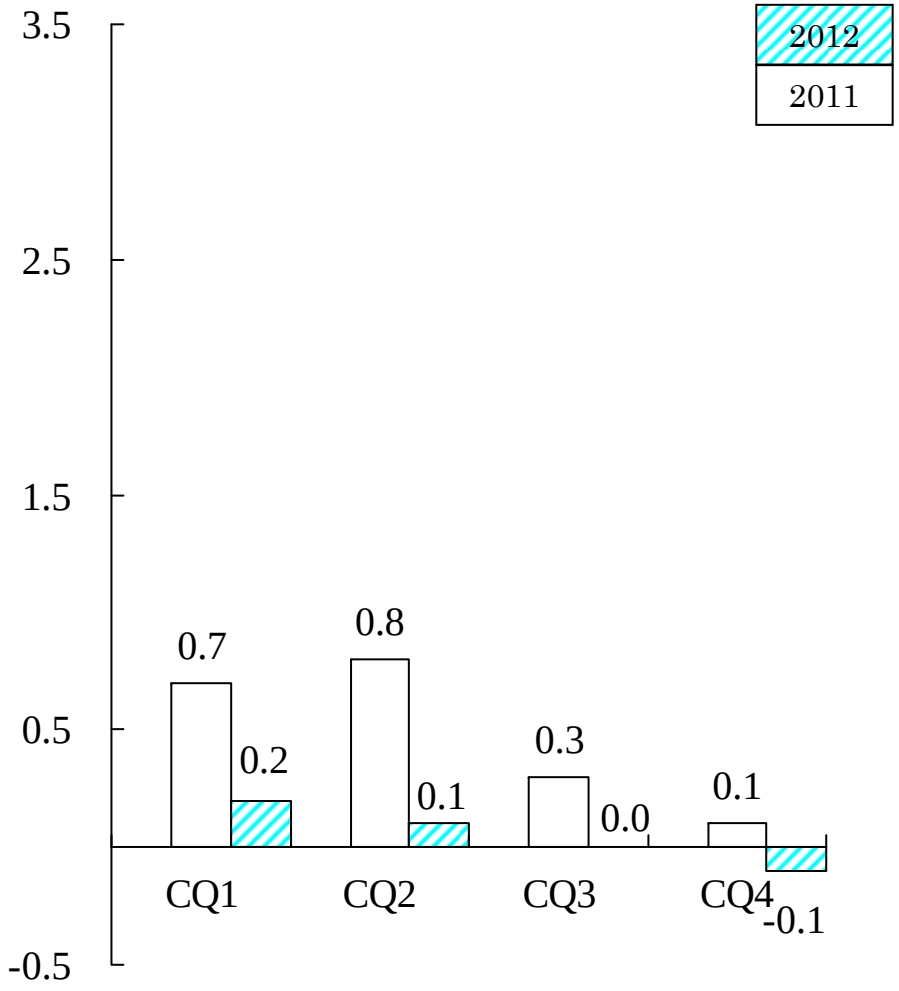
《Aluminum》

(Unit: Billions of Yen)



《Others》

(Unit: Billions of Yen)



Topics

Corporate

Acquisition of highest-level BCM rating from DBJ

- In August, SDK received a loan from Development Bank of Japan Inc. (DBJ), after acquiring the highest-level rating for its business continuity management (BCM). DBJ evaluates firms' ability to prevent disaster and continue business. SDK was highly evaluated for its efforts to make all of its facilities earthquake-proof, and to review and improve its supply chains. The Group will continue its efforts to establish a business system resistant to disaster, aiming to contribute toward creating a society where affluence and sustainability are harmonized.

Increasing SiC epitaxial wafer production capacity by 2.5 times

- In August, SDK increased its silicon carbide (SiC) epitaxial wafer production capacity at its Chichibu Plant by 2.5 times, to 1,500 units a month, through facility expansion and improvement in production technology. The wafers are used in SiC power devices for a wide range of applications, including automobiles, railcars, and home electric appliances. In particular, SiC power devices are expected to be used increasingly in inverters to control rotation of motors. Such inverters are already commercialized in some home electric appliances, and used in subway railcars. Following the capacity expansion, SDK will continue developing SiC epitaxial wafers with larger diameter, lower defect, and higher uniformity. Specifically, SDK will accelerate the development of six-inch SiC epitaxial wafers for heavy-current high-voltage applications.

Petrochemicals

Trouble with cooling unit of ethylene plant

- Trouble occurred in the cooling unit of SDK's ethylene plant at the Oita Complex. Due to the need to repair the cooling unit, SDK suspended operations of the ethylene plant on March 18. Normal operation was resumed on June 13.

Topics

Chemicals

- Establishment of subsidiary for high-purity-gas-related business
  - In July, SDK started using its wholly owned subsidiary Shanghai Showa Electronics Materials Co., Ltd. (SSE) to strengthen its business in China related to high-purity gases for electronics. SSE produces and sells equipment for treating used high-purity gases resulting from the production of semiconductors. SSE will expand its operations in the future, covering production, sale, and distribution of high-purity gases for the Chinese electronics industry.

- Entering partnership agreement with BIASep
  - In December, SDK signed a strategic partnership agreement with BIA Separations (BIASep), of Austria, aiming to expand its business to the rapidly growing market of purification resins used for manufacturing biopharmaceuticals and industrial manufacturing processes. The partnership includes SDK's investment in BIASep as well as joint marketing and R&D. SDK is conducting a separation/refining business pertaining to high-performance liquid chromatography, providing analytical columns (Shodex^{TM}). Purification resins are used for refining desired components/chemicals from culture/reaction solutions. SDK's protein separation/refining technology acquired through the Shodex^{TM} business will be fully utilized, as protein purification plays a key role in the purifying process for biopharmaceuticals. Through the partnership arrangement with BIASep, SDK will acquire know-how concerning development, production, quality control, and marketing of purification resins. SDK will aim to strengthen business relations with producers of biopharmaceuticals, thereby expanding its separation/refining business.

Topics

Chemicals

- Starting production of bio-based biodegradable plastic *Bionolle*™
  - SDK has developed a new technology to produce biodegradable polyester resin *Bionolle*™ using succinic acid made from starches or sugars. In July, SDK started providing film-grade samples of the product. *Bionolle*™, which can be fully decomposed after use into water and carbon dioxide, has been used in compost bags and various types of films.

- Development of new method for stable solidification of insoluble ferrocyanide
  - Union Showa K.K., a joint venture between SDK and UOP LLC, of the United States, announced that it successfully developed a new method of stable solidification of insoluble ferrocyanide widely used to remove radioactive cesium. Insoluble ferrocyanide maintains high cesium-adsorbing-volume capacity even in contaminated radioactive cooling water. However, insoluble ferrocyanide is easily decomposed by heat, resulting in vaporization of cesium. Thus, an innovative method of heat solidification had been sought. Union Showa, under the guidance of Professor Mimura of Tohoku University, succeeded in developing a new method of stable solidification by heat-treating mixture of used ferrocyanide and zeolite. Under the method, zeolite traps vaporized cesium, preventing the release of vaporized cesium into the air.

Topics

Electronics

- **Provision of cultivation technology to plant growth facility in Fukushima**
  - SDK decided to provide Kawauchi Village, Fukushima Prefecture, with a new cultivation method for LED-based plant growth facilities for free. The village is building an LED-based plant growth facility, and is planning to start producing leaf lettuce and herbs in April 2013. SDK will continue to contribute toward ensuring stable supply of safe food and promoting agriculture through the provision of LED chips that emit light with optimized wavelengths for plant growth, and the innovative Shigyo method technology.

    Note: SDK has developed the new cultivation method jointly with Professor Shigyo, Faculty of Agriculture, Yamaguchi University. Compared with conventional LED-based plant growth facilities, the new method shortens shipment cycles and increases the amount of harvest through the irradiation of lights at optimized ratios for plant growth, using LED chips produced by SDK.

- **Establishment of JV for GaN LED chip business**
  - On December 1, SDK transferred its business in gallium-nitride (GaN)-based blue LED chips to its wholly owned subsidiary TS Opto Co., Ltd. through company split. On the same date, SDK transferred 70% of shares in TS Opto to Toyoda Gosei Co., Ltd., thereby making TS Opto a joint venture between SDK and Toyoda Gosei. Through the joint venture, SDK will aim to achieve synergistic effect in R&D, improving brightness and production efficiency. In the LED business other than the GaN LED chips, such as AlGaInP, GaAs, and GaP, SDK will continue its independent operations..

Topics

Inorganics

Investment in a graphite electrode company in China

- In April, SDK signed an agreement with Sinosteel Corporation, of China, to acquire 67% of shares in Sinosteel's wholly owned subsidiary Sinosteel Sichuan Carbon Co., Ltd. This is in accordance with SDK's plan to expand operations in China and other Asian countries to supply graphite electrodes used in electric steel production. Sichuan Carbon will become SDK's subsidiary subject to ratification by related government organizations. When Sichuan Carbon's 22,000 t/y plant is added to the existing facilities in Japan and the United States, the Showa Denko Group's total graphite electrode production capacity will reach 127,000 t/y. After capacity expansion in the United States, the Group's total capacity will further increase to 157,000 t/y in 2014. Thus, SDK will establish itself as a leading supplier of graphite electrodes in the world.

Development of titanium oxide particles with high photocatalytic activity

- In October, Showa Titanium Co., Ltd., a consolidated subsidiary of SDK, announced the development of titanium oxide fine particles for use in UV-light-responsive photocatalyst with highest-level activity. The product was developed as part of a project sponsored by the New Energy and Industrial Technology Development Organization (NEDO). When used as photocatalyst, titanium oxide causes strong oxidation/reduction reactions and exhibits ultra hydrophilicity in the presence of UV light. Thus, titanium-oxide-based photocatalyst is expected to contribute to environmental purification using natural energy, for such applications as antifogging window glass and antifouling coating for external walls. Showa Titanium has developed decahedral titanium oxide fine particles with minimized defect, by applying its technology to produce titanium oxide nanoparticles for ceramic capacitors. Showa Titanium has also established a technology to produce visible-light-responsive photocatalyst that enables purification of air and removal of stains inside a room. The company's photocatalyst effectively responds to visible light.

Topics

Inorganics

- Focusing on *VGCF*™-H for resin composite applications
  - SDK decided to focus on *VGCF*™-H grade to strengthen its business in carbon nanotube for resin composite applications. *VGCF*™-H grade is already used in LIBs. In June, SDK closed its production facility for *VGCF*™-X, a grade intended exclusively for resin composite applications.

Aluminum

- Construction of an aluminum casting plant in Malaysia
  - SDK established an aluminum casting subsidiary Shotic Malaysia Sdn. Bhd. in the state of Johor, Malaysia. The new subsidiary will start commercial production by the end of 2014. In addition to an integrated aluminum casting/forging facility at Kitakata, Japan, SDK is operating one each plant in Portugal and Singapore for producing forged aluminum parts. SDK has been selling the products (trade name: Shotic) on the world market, mainly for use in automotive parts. With the scheduled construction of the new casting plant in Malaysia, SDK aims to better meet growing demand in the Asian market. By securing casting capability at two locations, SDK intends to ensure the security of supply. SDK will expand the Shotic business as a key component of its Aluminum segment.

- Construction of a high-purity aluminum foils plant in China
  - In March, SDK held a groundbreaking ceremony for its subsidiary Showa Denko Aluminum (Nantong) Co., Ltd. at a site in Nantong Jiangsu Province, China. The new subsidiary forms part of SDK's plan to expand the capacitor-grade high-purity aluminum foils business. The new plant in China, scheduled for start-up in the second half of 2013, will finish rolled foils supplied from SDK's Sakai Plant, and supply final products to customers in China. Aluminum electrolytic capacitors are used widely in electric appliances and transport machinery. Demand for aluminum electrolytic capacitors in China is expected to grow, reflecting continued economic growth in that country. With the establishment of the new plant in China, SDK aims to meet the growing demand for capacitor-grade high-purity aluminum foils in a timely manner.

Topics

Aluminum

- Transfer of automotive heat exchanger business
  - In January, SDK completed the transfer of its business in automotive air-conditioner heat exchangers (condensers, evaporators, etc.) to Keihin Corporation by transferring 60% of shares in Thermal Technology Corporation. The remaining 40% of shares will be transferred to Keihin Corporation in 2014.

Others

- Increasing LIB packaging material production capacity
  - In August, Showa Denko Packaging Co., Ltd., a consolidated subsidiary of SDK, decided to increase its production capacity for aluminum laminated films used for packaging LIBs. Specifically, Showa Denko Packaging decided to double its annual production capacity versus the 2010 level by the second half of 2013. Compared with metallic LIBs, pouch-type LIBs based on aluminum laminated films provide higher flexibility in molding, lighter weight, and better heat dissipation. Thus, pouch-type LIBs are widely used as small LIBs for portable devices. Reflecting the rapid growth of the market for smartphones and tablet PCs, demand for aluminum laminated film is expected to grow, as it contributes toward the miniaturization of LIBs