

China Li-ion Battery E-News

VOL.2 Issue 2, February,28, 2015





Contents

Headline	3
Editor's Note	4
Raw Materials	5
China's lithium resources exploited at higher speed in 2014	5
Chinese battery-grade lithium carbonate market continues upturn in Feb. 2015	6
Steyr Motors: to control Qinghai Hengxinrong and barge into Li-ion battery sector	7
Tianqi Lithium to proceed with share trade suspension	9
Cathode Materials	9
Ternary cathode material Li-ion battery to rise in power Li-ion battery market	9
Electrolyte	10
Chinese electrolyte manufacturers should proactively develop electrolyte formula jointly with downstream clients	10
Oxiranchem to launch Li-ion battery electrolyte solvent project	13
Separator	13
Challenges to China's Li-ion battery separator industry in 2015	13
Cangzhou Mingzhu: steady growth in revenue	16
Anode Materials	17
CBG to raise share ratio in BTR	17
OceanSun successfully develops technology for use of silicon-based anode in Li-ion battery	19
Downstream Market	19
Do-Fluoride to raise USD97.77 million for further development of Li-ion battery business	19
Li-ion battery exempted from consumption tax in China	21
Samsung's power Li-ion battery supporting projects centered in Yangling Fuhai Industrial Park	22
Import & Export	22
Import and export of major Li-ion battery materials and Li-ion batteries in China in Dec. 2014	22
Price Update	25
Ex-works prices of major Li-ion battery materials in China in Feb. 2015	25
Flash News	25
Beijing Easpring puts Li-ion battery cathode material plant into massive production	25
Tianjin DG puts Li-ion battery separator production line into operation	26
Jungheinrich launches new-generation Li-ion battery	26



Headline

In 2014, China's lithium resources, mainly including lithium ore and salt lake lithium resources, were exploited at higher speed.

In early February 2015, the battery-grade lithium carbonate market continued the upturns, driven up by the explosive growth of downstream alternative energy vehicle industry and the price increase of upstream lithium ore. It is believed that the price of battery-grade lithium carbonate still has potential to increase.

In February 2015, Steyr Motors planned to hold the stake of Qinghai Hengxinrong with USD24.93 million (RMB153 million) to officially barge into the Li-ion battery sector. This would be beneficial to the expansion of Steyr Motors' investment field and the extension of Steyr Motors' alternative energy automobile industrial chain. Meanwhile, developing battery-grade lithium carbonate can also boost a new profit growth for Steyr Motors.

Since the technology for ternary cathode material to be applied in power Li-ion battery is maturing, it is believed that ternary cathode material Li-ion battery will rise in the power Li-ion battery market.

China's electrolyte industry develops rapidly and occupies constantly rising market share in the world. However, the development is too rapid and disordered. Most of enterprises can not be suppliers of large Li-ion battery manufacturers, which results in problems like structural surpluses, falling price of low-end products, etc. in China's electrolyte market. In this case, proactively developing electrolyte formula jointly with downstream clients is the way for China's electrolyte industry to survive.

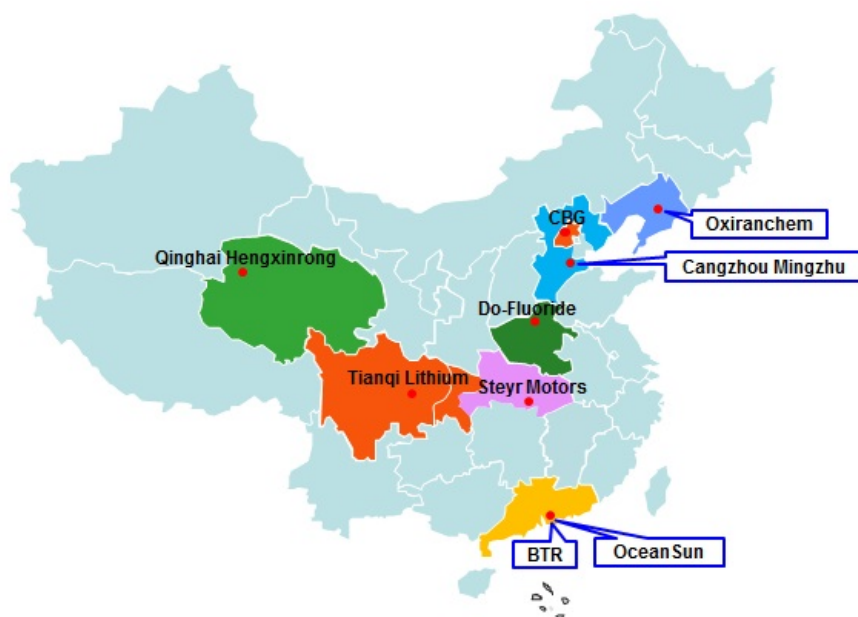
In 2014, Chinese Li-ion battery separator enterprises achieved favorable benefits and many problems existed at the same time. CCM believes that the challenges in Li-ion battery separators regarding technology, price and alternative energy vehicle fields are worth attention.

According to preliminary statistics released by Cangzhou Mingzhu, the company achieved expected steady growth in revenue in 2014. In 2015, the newly established separator project is hopefully to increase the company's revenue.

In February 2015, CBG raised the share ratio in BTR. This marks a step for CBG to achieve strategic transformation and upgrading into a high-tech group. Supported by CBG, BTR will largely increase input into the innovation in Li-ion battery anode material in 2015, a year for anode material enterprises to improve technology and quicken differentiated development.

At the end of January 2015, Do-Fluoride, a Chinese leading fluorochemical enterprise marching into downstream Li-ion battery business with developed LiPF₆, announced to raise USD97.77 million fund for the launching of a high-energy power Li-ion battery pack project. It aimed to expand the production capacity and meet the rapidly growing market demand.

On 27 Jan., 2015, the MOF notified that consumption tax will be levied on some batteries, excluding Li-ion battery. This policy will have an impact on the development of Chinese battery market and promote the popularity of Li-ion battery in China.





Editor's Note

In February 2015, some Chinese leading enterprises strived for cross-industrial development and marched into Li-ion battery industry, since they are optimistic about the industry prospect.

- Steyr Motors: to raise USD24.93 million for the acquisition of 51% of shares in Qinghai Hengxinrong and to officially step into Li-ion battery raw material field. It may further extend into downstream industries to satisfy the demand from hybrid power system.
- CBG: to strengthen control on BTR and acquire another 32.1457% of shares in BTR. It marks a strategic transformation for CBG who intends to further develop Li-ion battery anode materials and to form high-tech businesses.

In addition, Do-Fluoride, a leader in the fluorochemical industry, announced to raise USD97.77 million for the development of its high-energy power Li-ion battery pack project. It aimed to expand production capacity and meet the rapidly increasing demand.

CCM believes that the competition in Chinese Li-ion battery industry will be intensified, as the cross-industrial involvement will grow. Therefore, Li-ion battery enterprises should make more efforts to master core technology, optimize and upgrade product structure and seek for premium and differentiated development, so as to solidify their positions in the market.

The USD/RMB exchange rate in this report is USD1.00=RMB6.1370 on 2 Feb., 2015, sourced from the *People's Bank of China*. All the prices mentioned in this report will include the VAT, unless otherwise specified.

If you would like to cover any specific topics or investigate any covered subjects in more details, please contact us on +86-20- 3761 6606, or econtact@cnchemicals.com.



Raw Materials

China's lithium resources exploited at higher speed in 2014

In 2014, China's lithium resources, mainly including lithium ore and salt lake lithium resources, were exploited at higher speed.

In 2014, both lithium ore and salt lake lithium resources were exploited at higher speed.

Regarding the exploitation of lithium ore, many Chinese enterprises expanded their production capacity through M&As in 2014:

- Sichuan Tianqi Lithium Industries Inc.: carried out merger on Galaxy Lithium (Jiangsu) Co., Ltd. (Galaxy Lithium Jiangsu);
- Sichuan Yahua Industrial Group Co., Ltd. (Yahua Group): acquired Sichuan State Lithium Materials Co., Ltd. (State Lithium) and Blossom Lithium Industrial (Sichuan) Limited.

In terms of the exploitation of salt lake lithium resources, in 2014, Zabuye Salt Lake of Tibet produced about 4,000 tonnes of lithium carbonate, an expected output. Technical breakthrough has been achieved regarding the lithium recycled from bittern after the extraction of sylvite from Qarhan Salt Lake and Eastern and Western Taiji Nai'er Lake of Qinghai Province. The output in 2015 is hopefully to further grow.

Table 1: Exploitation status of China's lithium resources in 2014

Company	Event
Steyr Motors	Increased capital in Qinghai Hengxinrong in February 2015 and exploited salt lake lithium resources.
Rongda Lithium	Got mineral right in 2013; Focused on the optimization and adjustment of the construction scheme regarding mine production capacity expansion; Total lithium ore reserves reached 28.99 million tonnes.
Yahua Group	Having focused on the exploitation of lithium mines after the acquisition of State Lithium in December 2013; Resource quantity reached 40.36 million tonnes (512,185 tonnes calculated by lithium oxide); Mining and oredressing capacity to reach 630,000 t/a in 2017 and 1.05 million t/a in 2018.
Zhonghe	Barged into the lithium battery industry in 2012; With the proceeding of the lithium ore exploration project, Jinxing Mining, Zhonghe's subsidiary, improved its proven reserves from 290,000 tonnes to 480,000 tonnes (calculated by lithium oxide); Main work of production capacity expansion is basically finished, estimated to put into operation in 2015.

Note: Steyr Motors stands for Steyr Motors Corp.; Qinghai Hengxinrong stands for Qinghai Hengxinrong Lithium Technology Co., Ltd.; Rongda Lithium stands for Ganzizhou Rongda Lithium Co., Ltd.; Yahua Group stands for Sichuan Yahua Industrial Group Co., Ltd.; State Lithium stands for Sichuan State Lithium Materials Co., Ltd.; Zhonghe stands for Zhonghe Co., Ltd.; Jinxing Mining stands for Malta Kang Jinxing Mining Co., Ltd.

Source: CCM

CCM found that China's lithium carbonate and lithium hydroxide are mainly used as Li-ion battery materials, especially cathode materials such as lithium cobaltate (LCO), lithium nickel cobalt manganate (NCM), lithium manganate (LMO) and lithium ferrous phosphate (LFP).

Driven by downstream markets, China's Li-ion battery cathode material market grew in 2014. According to statistics from Lithium



Industry Branch, China Nonferrous Metals Industry Association, in 2014, China's output of Li-ion battery cathode materials were as follows:

- LCO: 43,000 tonnes;
- LMO: 12,000 tonnes;
- LFP: 12,000 tonnes;
- NCM: 31,000 tonnes.

Table 2: Output of major lithium materials in China, 2013-2014, thousand tonnes

Product	2014	2013	YoY change
Lithium carbonate	40.7	38	7.11%
Lithium hydroxide monohydrate	20.5	22	-6.82%
Lithium metal	2.6	2.3	13.04%
LCO	43	38	13.16%
NCM	31	23	34.78%
LMO	12	10	20.00%
LFP	12	5	140.00%

Note: LCO stands for lithium cobaltate; NCM stands for lithium nickel cobalt manganate; LMO stands for lithium manganate; LFP stands for lithium ferrous phosphate.

Source: Lithium Industry Branch, China Nonferrous Metals Industry Association & CCM

On the basis of data from the Institute of Mineral Resource Chinese Academy of Geological Sciences, the quantity of lithium resources (calculated by lithium oxide) reaches 7.14 million tonnes in China, reserves being 3.83 million tonnes. The resources are mainly distributed in Qinghai Province, Tibet Autonomous Region, Xinjiang Uygur Autonomous Region, Sichuan Province, Jiangxi Province, Hunan Province, etc. Specifically, lithium resources in Tibet and Qinghai are salt lake bittern and are granite pegmatite or granite ore in Xinjiang, Sichuan, Jiangxi, Hunan, etc.

Chinese battery-grade lithium carbonate market continues upturn in Feb. 2015

In early February 2015, the battery-grade lithium carbonate market continued the upturns, driven up by the explosive growth of downstream alternative energy vehicle industry and the price increase of upstream lithium ore. It is believed that the price of battery-grade lithium carbonate still has potential to increase.

In early February 2015, Chinese battery-grade lithium carbonate market continued the upturn. From this, the price increase traced back to June 2014, was continuous. As of the end of January 2015, the ex-works prices of battery-grade lithium carbonate (low-end) and battery-grade lithium carbonate (high-end) increased largely, respectively being USD6,537/t and USD6,700/t and rising by 5.57% and 5.43% over that in June 2014 .

This can be attributed to the strengthened demand caused by the development of Li-ion battery industry, which is further driven up by the explosive growth of alternative energy vehicle industry. Meanwhile, the price rise of upstream lithium ore also urged the price increase of battery-grade lithium carbonate. The price of lithium concentrate from Oceania, major supply region of lithium ore in the globe, increased by about USD50/t in November 2014, up by over 10% over that in October.

CCM predicts that the price of battery-grade lithium carbonate will continue to increase in a short term, due to the following reasons.





1. The price of lithium ore will maintain high. Industry experts believed that the price of lithium concentrate would continue the increase. This would also promote the price of battery-grade lithium carbonate to rise.
2. The supply of battery-grade lithium carbonate will be shrunk. Manufacturers involved in the extraction of lithium carbonate from salt lakes in places such as Qinghai Province and Tibet Autonomous Region suspend production gradually, because of the seasonal low temperature. This will reduce the supply as a whole, and stimulate the price to increase in a short term.
3. Downstream demand will continue to increase rapidly. On 28 Jan., 2015, the Ministry of Industry and Information Technology of the People's Republic of China (MIIT) held a press conference concerning the development of industrial telecommunication industry, in which the MIIT stated that all-level governments were attaching great importance to the development of alternative energy vehicle industry. In 2014, the accumulative output of alternative energy vehicle reached 83,900, up by about 4 times year on year. In addition, the construction of supporting facilities is quickened. In 2014, altogether 723 charging stations and 28,000 charging piles were established.

In 2015, the government would strengthen the support for the development of alternative energy vehicle industry. For instance, the access to alternative energy vehicle industry will be further regulated. The previously released subsidy-oriented alternative energy vehicle catalogues will be replaced with put-on-record proposal. If home-made alternative energy vehicles in line with local subsidy policies are put on record successfully, they can be sold, registered for license plates and subsidized in local markets. This indicates that all home-made alternative energy vehicles filling the requirements will not be restrained by the vehicle catalogues and be subsidized. It will quicken the promotion of alternative energy vehicle nationwide. Hopefully in 2015, the output will surpass 200,000, boosting large demand for battery-grade lithium carbonate.

Chinese battery-grade lithium carbonate industry is marching into sound development. The improvement in industry intensiveness will facilitate the regulated operation and upward market trend. For instance, 2 leading enterprises, Sichuan Tianqi Lithium Industries Inc. and Jiangxi Ganfeng Lithium Co., Ltd. have claimed over 60% of sales in total in home market, after the expansion and distribution of production capacities.

Steyr Motors: to control Qinghai Hengxinrong and barge into Li-ion battery sector

In February 2015, Steyr Motors planned to hold the stake of Qinghai Hengxinrong with USD24.93 million (RMB153 million) to officially barge into the Li-ion battery sector. This would be beneficial to the expansion of Steyr Motors' investment field and the extension of Steyr Motors' alternative energy automobile industrial chain. Meanwhile, developing battery-grade lithium carbonate can also boost a new profit growth for Steyr Motors.

On 6 Feb., 2015, Steyr Motors Corp. (Steyr Motors) announced that Steyr Motors (Jiangsu) Investment Co., Ltd., a wholly-owned subsidiary of Steyr Motors, with its self-raised capital, planned to increase USD24.93 million (RMB153 million) in Qinghai Hengxinrong Lithium Technology Co., Ltd. (Qinghai Hengxinrong) and to succeed in controlling Qinghai Hengxinrong (51% of shares), so as to officially barge into the Li-ion battery sector.

It is known that Steyr Motors concentrates on the R&D, production and sales of marine engine, vehicle engine and aircraft engine and also on producing & selling automobile spare parts and investing in high-tech enterprises.

Founded in March 2014, Qinghai Hengxinrong is mainly engaged in the R&D and sales of salt lake products such as lithium (Li),





potassium, boron and magnesium (Mg). Since June 2014, Qinghai Hengxinrong has planned to launch a 20,000 t/a battery-grade lithium carbonate project. From this, the battery-grade lithium carbonate project with a production capacity of 2,000 t/a was officially put into trial production on 10 Dec., 2014. The other production lines are now under equipment installation and adjustment.

As for this investment, Steyr Motors stated that, through this investment, technical problems including the separation of lithium from magnesium and lithium concentration in the low Li:Mg ratio salt lake bittern could be solved and the lithium extraction in Qinghai salt lakes could be achieved with low cost, to fill the technology gap in China. At the meantime, the problem of supplying battery-grade lithium carbonate brought by the rapid growth of alternative energy vehicle could be solved, which is of high strategic significance.

In order to reduce the risk brought by the investment, Steyr Motors intended to make this investment in two phases:

- Phase 1: USD9.77 million (RMB60 million);
- Phase 2: USD15.15 million (RMB93 million).

The 2nd phase will be carried out when adjustment of the lithium concentration and lithium precipitation devices are completed before 30 April, 2015 and battery-grade lithium carbonate can be produced stably and product quality and stability risks are fully estimated and confirmed in Qinghai Hengxinrong's 2,000 t/a battery-grade lithium carbonate production line.

CCM believed that this investment would be beneficial to the expansion of Steyr Motors' investment field and the extension of Steyr Motors' alternative energy vehicle industrial chain. Meanwhile, developing battery-grade lithium carbonate can also boost a new profit growth for Steyr Motors. Specifically:

In the battery-grade lithium carbonate project into which Steyr Motors invested, salt lake resource is the raw material and lithium ore is not needed. The price of lithium ore stays at high levels at present and shows an upward trend. This will certainly drive up the price of battery-grade lithium carbonate produced with lithium ore. In this battery-grade lithium carbonate project, the price of battery-grade lithium carbonate will not be affected by the price of lithium ore. The cost advantage is more obvious.

Meanwhile, battery-grade lithium carbonate is one of the main raw materials for power Li-ion battery. From 1 Feb., 2015, lithium primary battery and Li-ion battery are free from consumption tax. Undoubtedly, it is a great favorable factor for the development of battery-grade lithium carbonate. In addition, the power Li-ion battery industry is mainly promoted by the explosive growth of the alternative energy vehicle industry. In 2014, China's alternative energy vehicle industry developed rapidly and its supporting facilities were constructed at higher speed. This will propel the development of the power Li-ion battery industry and then promote the development of upstream battery-grade lithium carbonate sector.

However, in the future production, the project will be greatly impacted by the seasonal factor. This is mainly because most of salt lakes in China are located in Qinghai Province and Tibet Autonomous Region. In cold winter, salt lake freezes. This will be an obstacle for running lithium extraction device, and will further compel enterprises to down-regulate operating rates and even suspend production completely.





Tianqi Lithium to proceed with share trade suspension

On 3 Feb., 2015, Sichuan Tianqi Lithium Industries, Inc. (Tianqi Lithium) made an announcement on the progressing of major events and stated to proceed with share trade suspension.

This is mainly because Tianqi Lithium passed the *Proposal to Signing the Revision and Restatement on Equity Acquisition Agreement* on 31 Jan., 2015. Related documents are under revision and improvement.

The revision and restatement on equity acquisition is targeted at the acquisition claimed by Tianqi Lithium at the end of August 2014. Tianqi Lithium planned to acquire 100% shares in Galaxy Lithium International Limited via its subsidiary, Tianqi HK Co., Limited, at a price of USD122 million. This will facilitate the capacity expansion in processing lithium resources and work in high coordination with the enterprise's development strategy – global distribution of lithium resources.

Cathode Materials

Ternary cathode material Li-ion battery to rise in power Li-ion battery market

Since the technology for ternary cathode material to be applied in power Li-ion battery is maturing, it is believed that ternary cathode material Li-ion battery will rise in the power Li-ion battery market.

At the end of January 2015, Guangzhou Libode New Material Co., Ltd. (Guangzhou Libode), a subsidiary of GuoGuang Electric Co., Ltd., announced that it had completed the construction of a ternary cathode material project and put it into operation.

Founded in 2014, Guangzhou Libode is dedicated to the R&D and development of premium cathode material. To date it has established a 1,000 t/a production line for lithium nickel cobalt manganate (NCM) and a 300 t/a production line for lithium nickel cobalt aluminum (NCA). Both materials are applied in high energy density Li-ion battery, especially power Li-ion battery.

Regarding production cost in Li-ion battery, cathode material accounts for over 30% of the total, marking the largest proportion. Meanwhile, cathode material is the key deciding each property indicator in the battery, such as energy density, power-to-weight ratio and safety performance.

At present, the mainstream cathode materials in China include lithium cobaltate (LCO), lithium manganate (LMO), lithium ferrous phosphate (LFP) and NCM.

Particularly in the power Li-ion battery, LFP Li-ion battery plays a dominant role, thanks to its relatively low price, high safety performance, high rate of dischargeability and long charging and discharging cycle life. All of these give impetus to its application in electric vehicle (EV).

As a rising cathode material, ternary cathode material adopts a more stable 1:1:1 structure. In a ternary cathode material Li-ion battery, electrolyte and special ceramic separator technology are used: from this, ceramic separator can cut off the short-circuit source when the battery encounters internal short circuit. This distinctly improves the battery's safety performance. Along with excellent properties such as high capacity, and maturing application technology, it is believed that ternary cathode material Li-ion battery will rise in the power Li-ion battery market.

In December 2014, Beijing Electric Vehicle Company, Beijing Automotive Industry Company (BAIC, BJEV) launched 2 EVs,



EV200 and ES210, in which BAIC, BJEV used ternary cathode material Li-ion battery instead of LFP Li-ion battery.

In January 2015, the 2014 Global New Energy Vehicle Conference (2014 GNEV) was held in Tianjin. At the salon entitled power battery, Doctor Xiao Chengwei from No. 18 Research Institute of China Electronics Technology Group Corporation attributed the popularity of ternary cathode material Li-ion battery to the maturing technology.

Hou Xiaohu, executive vice-president of Tianjin Lishen Battery Joint-Stock Co., Ltd. (Tianjin Lishen) expressed at the 2014 GNEV that the development of power Li-ion battery will usher upsurge in the future. Take Tianjin Lishen for example, its power Li-ion battery and consumer battery will share 1:1 sales in 2015. Moreover, Hou Xiaohu believed that the ternary material system will be more and more complete.

Table 3: Strengths & weaknesses of mainstream cathode materials

Cathode material	Strength	Weakness
LCO	Commercialized earliest, simple production process and stable electrochemical property	Weak safety performance and expensive Co material, along with resource shortage and serious pollution
LMO	Relatively low production cost and environmental friendly	Weak high-temperature resistance and obvious capacity losses
LFP	Better high-temperature resistance and higher rate of dischargeability	Extremely low tap density and compacted density, and relatively weak low-temperature resistance
NCM	High capacity and high safety performance	Low compacted density, complex production process; Concentrated on low and medium markets (Co will be mixed in use if it is applied in medium and premium products.)

Note: LCO stands for lithium cobaltate; LMO stands for lithium manganate; LFP stands for lithium ferrous phosphate; NCM stands for lithium nickel cobalt manganate.

Source: CCM

Electrolyte

Chinese electrolyte manufacturers should proactively develop electrolyte formula jointly with downstream clients

China's electrolyte industry develops rapidly and occupies constantly rising market share in the world. However, the development is too rapid and disordered. Most of enterprises can not be supplier of large Li-ion battery manufacturers, which results in problems like structural surpluses, falling price of low-end products, etc. in China's electrolyte market. In this case, proactively developing electrolyte formula jointly with downstream clients is the way for China's electrolyte industry to survive.



Regarding technology, electrolyte has become the most mature one among the 4 major Li-ion battery materials, namely, cathode material, anode material, separator and electrolyte. At present, electrolyte has been exported from China to overseas countries in large amounts. It claims more than 57% of the sales in the globe. The outbreak of the demand for electric vehicle will attract more leading electrolyte enterprises with superior R&D capability to enter the market. It can not be ignored that, since the world's Li-ion battery market is highly concentrated in several large enterprises, Chinese electrolyte enterprises can not be suppliers for the world's top 5 Li-ion battery enterprises and have a large amount of idle production capacity.

Chinese electrolyte enterprises continuously raising their shares in global market

With high ratio of performance to price, Chinese electrolyte enterprises usher constant increases in their market shares. Chinese leading electrolyte manufactures develop their production and R&D technology close to the international leading level. Enterprises, such as Zhangjiagang Guotai-Huarong New Chemical Materials Co., Ltd, Shenzhen Capchem Technology Co. Ltd. and Tianjin Jinniu Power Sources Material Co., Ltd., have launched their products on the international market. On the basis of primary statistics from CCM, Chinese electrolyte enterprises sold 34,600 tonnes of electrolyte in 2014 in total, a YoY growth of 48%. Chinese enterprises raised their shares in the global market, from 48.7% in 2011 to more than 57% in 2014.

Most of Chinese electrolyte enterprises have no cooperation with large battery manufacturers in world

The global Li-ion battery supply is highly concentrated. The Japan-based Institute of Information Technology Ltd. stated that the world's top 5 Li-ion battery manufacturers occupy more than 76% of the market shares. Electrolyte enterprises will not be able to claim most of the market shares, if they are not the suppliers for the world's top 5 i-ion battery manufacturers. Since power Li-ion battery has high requirement for safety performance and the certification is stricter, the market shares are grasped by only a few enterprises. From this, the world's top 5 Li-ion battery manufacturers take more than 90% of the power Li-ion battery market shares. This indicates the concentration of electrolyte suppliers, because they normally choose only 3-4 suppliers. Take Panasonic Co., Ltd. for example. It has 4 major suppliers for electrolyte.

Although China's electrolyte industry develops rapidly, most of the electrolyte enterprises can not be suppliers for the world's top 5 Li-ion battery manufacturers. Even though their projects are put into operation, the operating rates can not be high. According to incomplete statistics from CCM, as of the end of 2014, there were more than 40 electrolyte companies in China. The operating rate was less than 50% in 2014 and output of Li-ion battery electrolyte was estimated to reach 70,000 tonnes-80,000 tonnes. The sales volume of electrolyte in China was only about 35,000 tonnes. Therefore, the decreasing price is unavoidable in China's electrolyte market.

Chinese electrolyte manufacturers should proactively coordinate with downstream clients to develop electrolyte formula

The key for electrolyte is the material purification technology and formulation technology. Li-ion battery is widely used in all fields. Different technology routes and application fields have different requirements for electrolyte.

It is known that electrolyte has the function of conduction electron between the anode and cathode of the battery and is the guarantee for the advantages of Li-ion battery regarding its high voltage and high volumetric capacity. Normally, electrolyte is mixed by high purity organic solvents, LiPF_6 , LiBF_4 , additives and other raw materials according to a certain ratio. In China, only a few



Chinese electrolyte manufacturers can produce high-quality electrolyte to meet the requirements of international clients.

It is expected that Chinese electrolyte manufactures can cooperate with downstream clients to develop electrolyte formula and establish stable partnership, so as to effectively reduce the idle production capacity. Regarding the development trend of the Li-ion battery electrolyte, CCM suggests the following two points.

1. Increase voltage. Small battery emphasizes high-energy density. As for electrolyte, the development trend is to improve the working voltage in order to meet the high-energy density requirement. At present, the voltage of electrolyte has gradually improved from 4.35V to 4.40V, and would gradually develop to 4.5V, 4.75V and even 5V.

2. Maintain stability. Large power Li-ion battery usually works outdoors, strictly requiring the properties at both high and low temperature. Due to the poor heat stability, LiPF_6 is easy to resolve when heated. Therefore, stabilizer needs to be added in electrolyte so as to improve the cycle performance. Independent R&D of stabilizer is a necessary task for electrolyte manufacturers.

Table 4: Chinese major electrolyte enterprises, 2014

No.	Company	Capacity, t/a	Output, tonne	Sales, million USD
1	Zhangjiagang Guotai-Huarong New Chemical Materials Co., Ltd.	10,000	8,680	61.92
2	Shenzhen Capchem Technology Co., Ltd.	8,600	5,200	46.6
3	Tianjin Jinniu Power Sources Material Co., Ltd.	8,000	4,200	44
4	Dongguan Shanshan Battery Material Co., Ltd.	9,000	3,200	26.56
5	Guangzhou Tinci Materials Technology Co., Ltd.	3,200	2,950	26.56
6	Dongguan Kaixin Battery Materials Co., Ltd.	7,500	2,600	21.18
7	Zhuhai Smoothway Electronic Materials Co., Ltd.	3,500	2,500	19.55
8	Beijing Institute of Chemical Reagents	7,000	2,100	16.29
9	Shantou Jinguang High-Tech Co., Ltd.	6,000	2,000	12.22
10	Huzhou Chuangya Power Battery Materials Co., Ltd.	1,500	900	11.57
Total		64,300	34,330	286.46

Source: CCID Consulting & CCM



Oxiranchem to launch Li-ion battery electrolyte solvent project

On 4 Feb., 2015, Liaoning Oxiranchem, Inc. (Oxiranchem) announced that the feasibility research on the 20,000 t/a ethylene carbonate pilot project had been finished. Ethylene carbonate is a solvent for electrolyte in Li-ion battery.

Oxiranchem would make announcements on related construction before April 2015. It is predicted that the construction of the principal part will be completed in 2015. When the project is put into operation, Oxiranchem will march into Li-ion battery electrolyte field. This is a new profit growth point for the company.

Oxiranchem is specialized in oxirane fine chemical material business. It devotes itself to the R&D, production and sales of crystalline silicon cutting fluid used for photovoltaic battery, polyether monomer used for high-performance concrete water reducer, etc.

Separator

Challenges to China's Li-ion battery separator industry in 2015

In 2014, Chinese Li-ion battery separator enterprises achieved favorable benefits and many problems existed at the same time. CCM believes that the challenges in Li-ion battery separators regarding technology, price and alternative energy vehicle fields are worth attention.

With the growing popularity of China's power Li-ion battery, China's Li-ion battery separator industry ushers good development opportunity. According to preliminary statistics from China Plastics Processing Industry Association (CPPIA), the sales volume of Li-ion battery separators in China reached 310 million m² in 2014, with a YoY increase of 24%. On the basis of the annual reports released by Chinese major Li-ion battery separator enterprises, the revenue and profit were satisfactory in 2014 and there would be production capacity expansion plan in the following 2 years. CCM predicts that, in 2015-2016, China's Li-ion battery separator industry would be enlarged by 15%-20%.

However, China's Li-ion battery separator industry also faces many challenges, such as the lack for core technology, rising output & declining price and defect in the promotion of alternative energy vehicle.

Enterprises from the US, Japan and South Korea monopolize the advanced technology

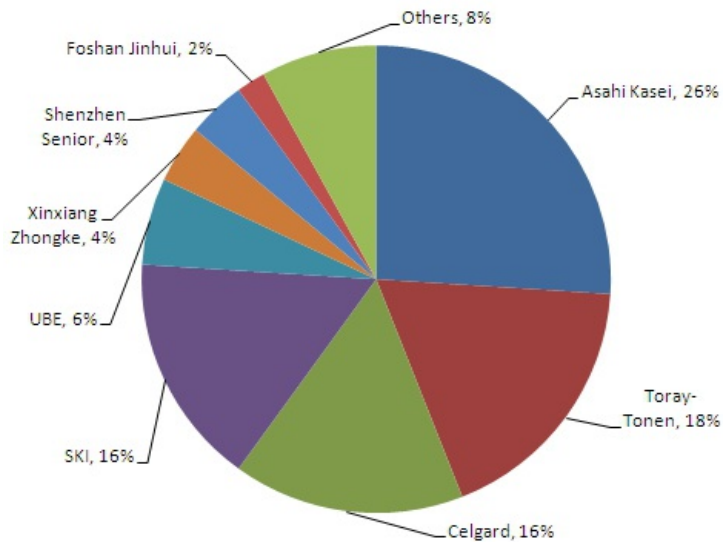
Separator is a material for Li-ion battery with advanced technology and high value added. The cost of separator accounts for 20%-25% of the cost of battery. At present, enterprises from the US and Japan form the oligopoly market with their advanced technology. The world's largest 4 enterprises (Japan-based Asahi Kasei Corp., the US-based Celgard LLC., Japan-based Toray Tonen Specialty Separator, affiliated to TonenGeneral Sekiyu K.K. and South Korea-based SK Innovation Co., Ltd.) monopolize 76% of the sales in the world. In China, only 3 enterprises are able to produce medium and premium Li-ion battery separators, namely Cangzhou Mingzhu Separator Technology Co., Ltd., Shenzhen Senior Technology Material Co., Ltd. and Foshan Jinhui Hi-Tech Optoelectronic Material Co., Ltd. (joint venture of FSPG Hi-Tech Co., Ltd. and BYD Company Limited).

Since most of separator manufacturers do not have their own core technology, they can not be suppliers of the world's large Li-ion battery manufacturers and have a large amount of idle production capacity. For example, in 2013, China's total production capacity



for separators reached 840 million m²/a but the output was only 259 million m²/a, and the rate of capacity utilization was only 31%. In 2014, the status did not significantly improve and more than 50% of the power battery producers relied on the imports of high-end separators.

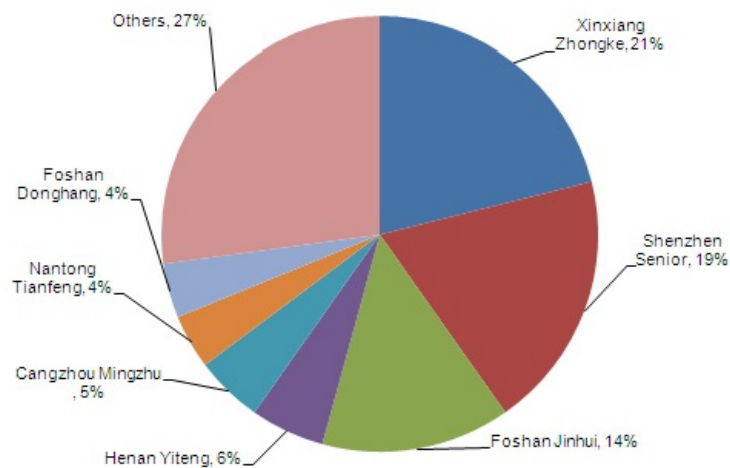
Figure 1: Market shares of major Li-ion battery separator enterprises in globe, 2014



Note: Asahi Kasei stands for Asahi Kasei Corporation (Japan); Toray-Tonen stands for Toray Tonen Specialty Separator (Japan); Celgard stands for Celgard, LLC (the US); SKI stands for SK Innovation Co., Ltd. (South Korea); UBE stands for Ube Industries, Ltd. (Japan); Xinxiang Zhongke stands for Xinxiang Zhongke Science and Technology Co., Ltd. (China); Shenzhen Senior stands for Shenzhen Senior Technology Material Co., Ltd. (China); Foshan Jinhui Hi-Tech stands for Foshan Jinhui Hi-Tech Optoelectronic Material Co., Ltd. (China)

Source: CCID Consulting & CCM

Figure 2: Market shares of major Li-ion battery separator enterprises in China, 2014



Note: 1. Xinxiang Zhongke for Xinxiang Zhongke Science and Technology Co., Ltd. Shenzhen Senior for Shenzhen Senior Technology Material Foshan Jinhui for Foshan Jinhui Hi-Tech Optoelectronic Material Co., Ltd. Henan Yiteng for Henan YiTeng New Energy Technology Co., Ltd. Cangzhou Mingzhu for Cangzhou Mingzhu Separator Technology Co., Ltd. Nantong Tianfeng for Nantong Tianfeng New Electronic Materials Co., Ltd. Foshan Donghang for Foshan Donghang Optic Electric Technology Co., Ltd. 2. Imports not included.

Source: CCID Consulting & CCM

Price of Li-ion battery separator will decrease by 3%-5% in 2015

Due to the unstable quality and severe homogenization, the separator price keeps declining. In 2014, the price of wet-process separator decreased by 20%-25% year on year. From this:

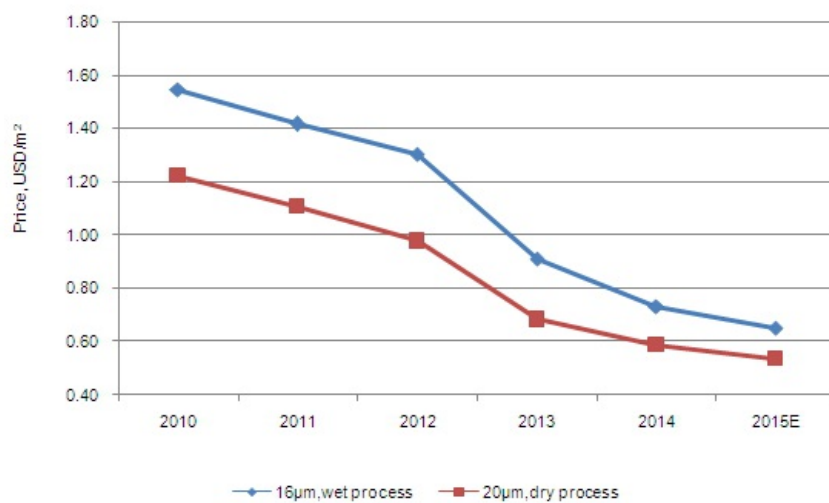
- 16µm high-end: USD0.89/m²-USD1.14/m² (RMB6/m²-RMB7/m²);
- 16µm mid-end: USD0.73/m²-USD0.78/m² (RMB4.5/m²-RMB4.8/m²);
- 16µm low-end: USD0.49/m² (RMB3/m²).

Regarding dry-process separator:

- 20µm high-end: USD0.73/m²-USD 0.85/m² (RMB4.5/m²-RMB5.2/m²);
- 20µm mid-end: USD0.57/m²-USD0.65/m² (RMB3.5/m²-RMB4/m²);
- 20µm low end: lower than USD0.49/m² (RMB3/m²).

It is predicted that the price of Li-ion battery separator will decrease by 3%-5% year on year in China in 2015.

Figure 3: Average price of Li-ion battery separator in China, 2010-2015E



Source: China Industrial Association of Power Sources & CCM

Alternative energy vehicle industry: much reliance on policies and defect in promotion

At present, the high popularity of alternative energy vehicle is closely related to the policy support. However, favorable policy can not become the long-term momentum for the development of the alternative energy vehicle industry. Currently, alternative energy vehicles are mainly applied in the urban public transit system and are not well accepted by the private car field. However, exiting problems, such as driving range, charging time and charging pile network, restrict the development of the alternative energy vehicle industry. Once there is no favorable policy, such problems will be magnified and will further set back the development of alternative energy vehicle industry and even the separator sector.



The alternative energy vehicle industry will develop progressively. It will cost some time for the stabilization of performance. There may be setbacks. Separator enterprises, as one section of the Li-ion battery industry chain, should make full preparation.

Cangzhou Mingzhu: steady growth in revenue

According to preliminary statistics released by Cangzhou Mingzhu, the company achieved expected steady growth in revenue in 2014. In 2015, the newly established separator project is hopefully to increase the company's revenue.

On 6 Feb., 2015, Cangzhou Mingzhu Separator Technology Co., Ltd. (Cangzhou Mingzhu) released a preliminary report, showing that the company achieved expected steady growth in revenue in 2014.

- Total revenue: USD340.55 million (RMB2.09 billion), YoY growth of 5.39%;
- Net profit: USD27.12 million (RMB166.44 million), YoY growth of 11.44%.

This is closely related to the increasing sales volume of Li-ion battery separators.

Alternative energy vehicle emerges

In 2014, China's alternative energy vehicle market developed at high speed. Although the international crude oil price stays low currently, alternative energy vehicle still shows its advantages compared with traditional vehicle in terms of environmental protection, user experience and cost saving. This is mainly because Chinese automobile manufacturers such as BYD Company Limited (BYD) have been constantly improving the technology for alternative energy vehicle. Along with government support, alternative energy vehicle is hopefully to keep rising at high speed in the future.

Separator, one of the 4 major materials for Li-ion battery and a key component of alternative energy vehicle, is in increasing demand in China.

- 2012: about 200 million m²;
- 2013: approximately 250 million m²;
- 2014: over 310 million m².

Commercial operation of new separator projects to ease supply shortage

To date the production capacity of Li-ion battery separator is about 25 million m²/a. In 2014, the Li-ion battery separator project of Cangzhou Mingzhu was operated at full capacity. Still, demand exceeded supply.

From 2015, Cangzhou Mingzhu will gradually put its new separator projects into operation, hopefully to alleviate the supply shortage.

- 1st project: 20 million m²/a, dry-process separator, to be completed in mid-2015;
- 2nd project: 25 million m²/a, wet-process separator, to be finished in H1 2016.

In 2015, it is predicted that the output of Li-ion battery separators from Cangzhou Mingzhu will reach 35 million m²-40 million m².

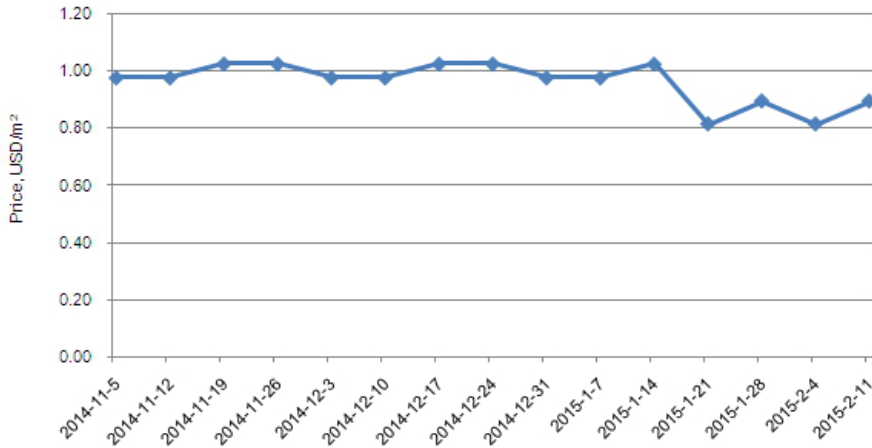
What's more, the optimization of product structure in Cangzhou Mingzhu can guarantee the high profit for a long time in the future. The proportion of power Li-ion battery separators in its Li-ion separator businesses is increasing to 70%, figure being 50% in



2013. Power Li-ion battery separator has become the main profit growth for the separator industry.

Therefore, CCM believed that Cangzhou Mingzhu's performance is hopefully to keep rising steadily in 2015.

Figure 4: Price of Cangzhou Mingzhu's separator, Nov. 2014-Feb. 2015



Note: Specification: 16-20µm

Source: Cangzhou Mingzhu Separator Technology Co., Ltd. & CCM

Anode Materials

CBG to raise share ratio in BTR

In February 2015, CBG raised the share ratio in BTR. This marks a step for CBG to achieve strategic transformation and upgrading into a high-tech group. Supported by CBG, BTR will largely increase input into the innovation in Li-ion battery anode material in 2015, a year for anode material enterprises to improve technology and quicken differentiated development.

On 3 Feb., 2015, China Baoan Group Co., Ltd. (CBG) announced that it planned to issue 86,871,657 shares in total, at a price of USD1.36 (RMB8.33) per share, to acquire 32.1457% of shares in Shenzhen BTR New Energy Materials Inc. (BTR). Now the acquisition pre-proposal has been approved by China Securities Regulatory Commission.

CBG founded in July 1983, went listed at Shenzhen Stock Exchange in June 1991. Specialized in 3 businesses, innovative and high technology, real estate and bio-pharmacy, it has listed enterprises such as Mayinglong Pharmaceutical Group Co., Ltd. and Baoan Hongji Real Estate Group Co., Ltd., and over 20 wholly-owned subsidiaries and shareholding companies.

BTR is an enterprise engaged in the R&D, production and sales of Li-ion battery materials. From this, it mainly involved in anode material business, establishing a complete industrial chain from graphite to anode material. It is the national standard maker for the *Graphite Anode Material for Li-ion Secondary Battery*. With international advanced technology, BTR has ranked first in the sales of Li-ion battery anode material in the globe.

In addition, BTR is able to achieve the industrialization of emerging Li-ion battery materials like lithium titanate (LTO), lithium ferrous phosphate (LFP), layered lithium manganate (LMO), graphene and nano conductive agent, product quality in the lead.

CBG is now undergoing strategic transformation and upgrading, aiming to develop into a high-tech group led by high-tech industry



and focusing on new material business. That CBG will raise share ratio in BTR will facilitate the implementation of CBG's high-tech industrial planning, ensure the sustainable and stable development of CBG, strengthen the sustainable operation ability and enhance the profitability. It is an internal integration. After acquisition, the ratios of BTR's net assets and business performance in the interests and net profit of CBG's shareholders will be further increased.

BTR, one of the global Li-ion battery anode material suppliers, is developing rapidly and boasting a promising prospect. This is firmly believed by CBG who would raise the share ratio in BTR. Strongly supported by CBG, BTR will largely increase input into the innovation in Li-ion battery anode material and solidify the leading position in the industry, which is now trapped in fierce competition, overcapacity (low-end products) and serious product homogenization.

In 2015, driven up by the explosive growth in downstream markets, the Li-ion battery anode material sector will develop fast. Involving enterprises will strive for technology improvement, thus quickening the differentiated development and changing the market structure. 2015 will see big changes and mark a milestone in the industry.

In terms of product:

1. Natural modified graphite. In 2015, the sales volume will show upward trend: stable demand from Li-ion battery for consumer electronic products and considerable anode material for power Li-ion battery.

2. Artificial graphite. In 2015, its growth rate regarding sales volume is expected to again take the lead. Thanks to the stable properties and fine compatibility with electrolyte, it is the mainstream anode material for polymer, power and energy storage Li-ion battery.

- The alternative energy vehicle market will see a rapid growth, by 2-3 times year on year in sales volume.

- The popularization of the 4th generation mobile communication technology will promote the construction of communication base stations.

All of these will strengthen the demand for Li-ion battery and furthermore for artificial graphite.

3. High-end artificial graphite. It will be more widely applied in Li-ion battery for consumer electronic product. Also, high-energy density artificial graphite to fulfill the fast-charging requirement will be launched on the market in 2015.

Additionally, technology progress in new-type anode materials should be paid attention. For instance, technology for the small serial production and application of silicon-carbon and stannum-carbon composite material is maturing.

However, domestic technology for hard carbon is still under slow development. Regarding product property and production cost, it shows no advantages in comparison with artificial graphite. In a short term, it will not be applied in power Li-ion battery at a large scale. Graphene under heated development, actually is not applicable as anode material to the existing Li-ion battery production technology system theoretically. It is hard to put into mass application.





OceanSun successfully develops technology for use of silicon-based anode in Li-ion battery

On 27 Jan., 2015, Shenzhen OceanSun Battery Co., Ltd. (OceanSun) announced that it had successfully developed a technology for the use of silicon-based anode in Li-ion battery.

Chen Xingrong, CEO and CTO in OceanSun stated that the development of Li-ion battery has gone through 3 stages, from steel shell battery, aluminum shell battery to polymer battery. Such batteries present a common ground, graphite as anode material. However, graphite is now at full electricity capacity in the practical application. At this time, OceanSun would substitute graphite with silicon-carbon via the developed technology, extending battery life of digital products such as smart phone and laptop by over 4 times.

In 2010, OceanSun began to develop this technology jointly with the US-based Enevate Corporation (Enevate). From 2010 to 2014, they invested over USD60 million in total. In December 2014, Enevate officially launched a new-type battery based on this technology in the US.

Downstream Market

Do-Fluoride to raise USD97.77 million for further development of Li-ion battery business

At the end of January 2015, Do-Fluoride, a Chinese leading fluorochemical enterprise marching into downstream Li-ion battery business with developed LiPF_6 , announced to raise USD97.77 million fund for the launching of a high-energy power Li-ion battery pack project. It aimed to expand the production capacity and meet the rapidly growing market demand.

On 27 Jan., 2015, Do-Fluoride Chemicals Co., Ltd. (Do-Fluoride) released the proposal on non-public share issuing, to distribute no more than 37,321,500 shares at a per-share price of USD2.63 (RMB16.11) and aim to raise a fund of USD97.77 million (RMB600 million). The fund would be invested in Li-ion battery business.

Stakeholders in this non-public share issuing involves Li Yunfeng as well as no more than 9 anonymous securities companies, investment organizations, natural persons, etc. From this, Li Yunfeng, the son of Li Shijiang, chairman of Do-Fluoride, will be obligated to subscribe at least 15% of the total shares, but could not go beyond 25%. Other subscribers are allowed to subscribe 50% of the total shares independently at most.

The raised fund will be applied to the newly launched high-energy power Li-ion battery pack project, with a production capacity of 300 million Ah/a. After a 2-year construction, the project is expected to be put into operation by the end of 2016. Optimally, it is anticipated to achieve annual revenue of USD206.78 million (RMB1.27 billion) and a pre-tax financial internal rate of return (FIRR) of 25.66%.

CCM believes that if Do-Fluoride is determined to develop Li-ion battery business, it absolutely has to enlarge investment size and launch more projects. Do-Fluoride's Li-ion battery production line (50 million Ah/a) is being operated at its full capacity, whereas it is still in short supply. In the near future, the alternative energy vehicle industry will be likely to keep this rapidly developing pace. Therefore, Do-Fluoride should seize the opportunity and further expand the production capacity.

Two major benefits will be brought by this follow-up project if it is as well put into full operation.





1. The production capacity for Li-ion battery will be largely expanded, and endow itself the ability to accommodate the incremental demand for the present and the future.

2. The raw material for Li-ion battery can be fully leveraged, so that the industrial chain could be extended and revamped to achieve scale economy. This will give full play to cost effectiveness, strengthen core competitiveness and solidify the standing in the Li-ion battery market.

More importantly, the further development of Li-ion battery business will quicken the transformation and upgrading of Do-Fluoride, orchestrate layers into the core business structure, and build up a product portfolio. In this way, it could coordinate the development between the fluorochemical and alternative energy businesses, reduce the operation and periodical risks caused by a lack of product variety, and strengthen the comprehensive risk tolerance as well as the sustainable profitability. At the end of the day, the objective of sustainable development will be achievable.

In recent years, Do-Fluoride has been seeking for breakthroughs in alternative energy outside its traditional fluorochemical business. Now it has cleared the development strategy: based on a major raw material, lithium hexafluorophosphate (LiPF₆, technological breakthrough and massive production in 2011), the company has devoted to the investment and development of downstream Li-ion battery, and established a complete industrial chain from Li-ion battery materials to power Li-ion battery.

At the end of 2014, Do-Fluoride made a big breakthrough in alternative energy vehicle powertrain system and intended to march into the production of battery electric vehicle (BEV) via its subsidiary, Do-Fluoride (Jiaozuo) New Energy Technology Co., Ltd. However, in a short term, it might not be achievable. This is mainly because of the exposure draft for public comments from the National Development and Reform Commission of the People's Republic of China, released on 26 Nov., 2014, pertaining to the *Interim Regulations for the Management on the Newly Established Investment Projects and the Production Access of Passenger BEV Manufacturers*, in which stricter regulations on the entry to the BEV production market are elaborated. Specifically, enterprises shall lay solid R&D foundation over BEV, with 3 years and above, to be qualified for the production of BEV.

The Municipal Government of Jiaozuo City (Henan Province) has shown strong support to Do-Fluoride for its penetration into BEV market. On 4 Dec., 2014, Mayor Zhang Wenshen of Jiaozuo City paid a visit to Do-Fluoride, along with Deputy Mayor Qiao Xueda and responsible persons from local governmental departments. At a conference, Mayor Zhang made it clear that all levels of departments should strongly support and qualify Do-Fluoride for the production of vehicles employing alternative energy in the shortest time. Meantime, Do-Fluoride was being set up as the regional business focus, for the establishment of the industrial manufacturing center for vehicles using alternative energy, based in Jiaozuo City.

In addition to the application in alternative energy vehicle, energy storage field can be another option to lithium ferrous phosphate (LFP) battery developed by Do-Fluoride. This will boost the enterprise's overall performance. The energy storage sector, as an emerging strategic business, possesses great development potential, and is expected to be an investment attractor. In line with the government orientation in alternative energy and clean energy, Chinese energy storage sector will usher vigorous development and generate greater demand for LFP battery.



Li-ion battery exempted from consumption tax in China

On 27 Jan., 2015, the MOF notified that consumption tax will be levied on some batteries, excluding Li-ion battery. This policy will have an impact on the development of Chinese battery market and promote the popularity of Li-ion battery in China.

On 27 Jan., 2015, the Ministry of Finance of the People's Republic of China (MOF) issued the *Notice to Levy Consumption Tax on Batteries and Coatings*. From 1 Feb., 2015, consumption tax will be levied on batteries and coatings. Procedures including production, consigned processing and import will be taxed, at a rate of 4%.

It is noteworthy that the consumption tax is not targeted at all batteries. Mercury-free battery, Ni-MH battery, lithium primary battery, Li-ion battery, solar cell, fuel cell and vanadium redox flow battery (VRB) are exempted from the taxation. Lead-acid battery will be exempted before 31 Dec., 2015, and be taxed (4%) from 1 Jan., 2016.

In a long term, the consumption tax policy issued will have an impact on the development of Chinese battery market. Also, it will promote the popularity of Li-ion battery in China and propel lead-acid battery enterprises to transform and upgrade.

Batteries exempted from consumption tax are energy-saving and environmental-friendly batteries. The government is leading the battery industry to develop in line with the concept of energy saving and environmental protection. Lead-acid battery, in comparison with energy saving and environmental-friendly battery, generates heavy pollution. Specifically it is disadvantaged in energy density, service life, etc.

Regarding application, vehicle start-stop system will be a breakthrough for Li-ion battery. At present, absorbed glass mat (AGM) lead-acid battery is commonly used in vehicle start-stop system in Chinese vehicle market. Domestic enterprises have not yet launched any Li-ion batteries applied in this field. However, technology is maturing. In January 2015, foreign enterprises, Johnson Controls, Inc. and Toshiba Corporation jointly released lithium titanate (LTO) battery for start-stop system.

In comparison with lead-acid battery, Li-ion battery boasts remarkable advantages, such as longer cycle life, higher power density and higher-rate charging and discharging. Now the price of Li-ion battery is higher than that of lead-acid battery. The implementation of the consumption tax policy will weaken the price advantage of lead-acid battery, and furthermore create opportunities for Li-ion battery to penetrate into lead-acid battery market.

Insiders of lead-acid battery industry revealed that consumption tax levied will negatively influence lead-acid battery enterprises. Under such a circumstance, lead-acid battery enterprises may develop Li-ion battery instead.

Samsung's power Li-ion battery supporting projects centered in Yangling Fuhai Industrial Park

On 24 Jan., 2015, Yangling Industrial Park Construction Investment Co., Ltd. announced that it had signed agreements with 3 South Korea-owned enterprises regarding the power Li-ion battery supporting projects of Samsung Group (Samsung), including:

- Shaanxi Xiangya Battery Technology Co., Ltd.: power Li-ion battery accessory injection molding project;
- Shaanxi Zhuxinxing Power Battery Technology Co., Ltd.: accessory project for Samsung SDI Co., Ltd.'s power Li-ion battery installed in electric vehicle;
- Shaanxi Xiangxin High-Tech Co., Ltd.: power Li-ion battery accessory project.

This indicated that Samsung's power Li-ion battery supporting projects are centered in Yangling Fuhai Industrial Park. With a total investment of USD60.29 million (RMB370 million), the projects are expected to achieve the output value of over USD48.88 million (RMB300 million).

Since 2014, Yangling Fuhai Industrial Park, with improved infrastructure, is proactively bringing in machinery, electronic and food businesses. At present, it has 8 projects in the park, investment totaling USD131.99 million (RMB810 million).

Import & Export

Import and export of major Li-ion battery materials and Li-ion batteries in China in Dec. 2014

Table 5: Imports of major Li-ion battery materials in China, Dec. 2014

Product	Volume, kg			Price, USD/kg		
	14-Dec.	13-Dec.	YoY change	14-Dec.	13-Dec.	YoY change
Lithium carbonate	1,434,327	892,680	60.68%	4.72	4.91	-3.87%
Lithium manganate (LMO)	340	1,925	-82.34%	10.55	13.43	-21.44%
Lithium ferrous phosphate (LFP)	129,031	87,813	46.94%	15.17	15.05	0.80%
Lithium nickel cobalt manganate (NCM)	77,055	7,450	934.30%	4.48	28.37	-84.21%

Source: China Customs & CCM

Table 6: Exports of major Li-ion battery materials in China, Dec. 2014

Product	Volume, kg			Price, USD/kg		
	14-Dec.	13-Dec.	YoY change	14-Dec.	13-Dec.	YoY change
Lithium carbonate	52,896	87,272	-39.39%	9.43	7.94	18.77%
Lithium manganate (LMO)	50,818	27,189	86.91%	6.5	6.2	4.84%
Lithium ferrous phosphate (LFP)	36,760	23,480	56.56%	19.03	15.04	26.53%
Lithium nickel cobalt manganate (NCM)	123,941	99,250	24.88%	19.25	18.25	5.48%

Source: China Customs & CCM

Table 7: Imports of major Li-ion batteries in China, Dec. 2014

Product	Volume, million units			Price, USD per unit		
	14-Dec.	13-Dec.	YoY change	14-Dec.	13-Dec.	YoY change
Li-ion storage battery	143.95	142.61	0.94%	1.95	2.03	-3.94%
Li-ion primary battery and primary battery pack	76.42	72.62	5.23%	0.26	0.22	18.18%

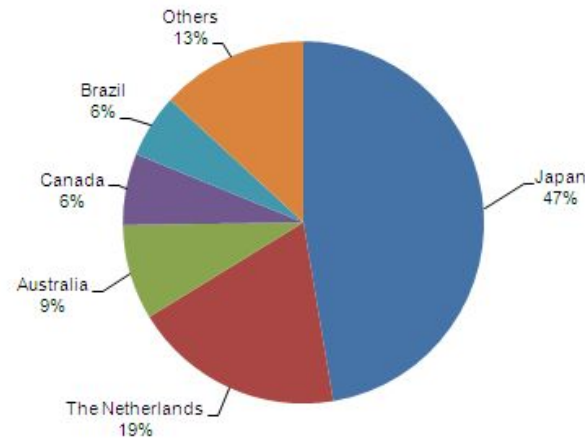
Source: China Customs & CCM

Table 8: Exports of major Li-ion batteries in China, Dec. 2014

Product	Volume, million units			Price, USD per unit		
	14-Dec.	13-Dec.	YoY change	14-Dec.	13-Dec.	YoY change
Li-ion storage battery	135.52	108.75	24.62%	4.22	4.18	0.96%
Li-ion primary battery and primary battery pack	87.50	83.80	4.42%	0.22	0.18	22.22%

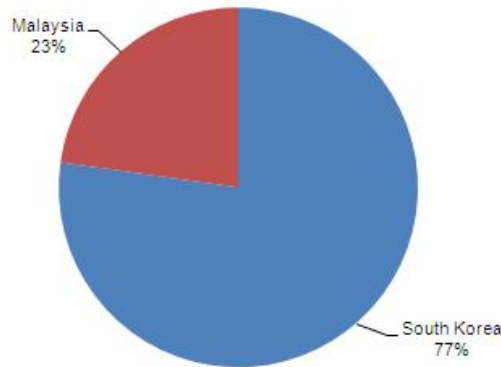
Source: China Customs & CCM

Figure 5: Export destinations of China's lithium carbonate by volume, Dec. 2014



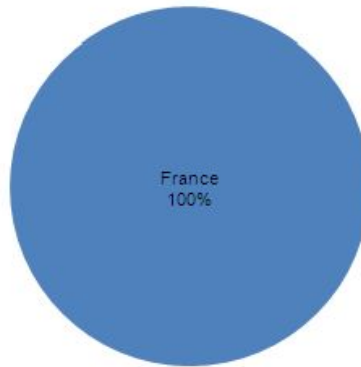
Source: China Customs & CCM

Figure 6: Export destinations of China's lithium manganate by volume, Dec. 2014



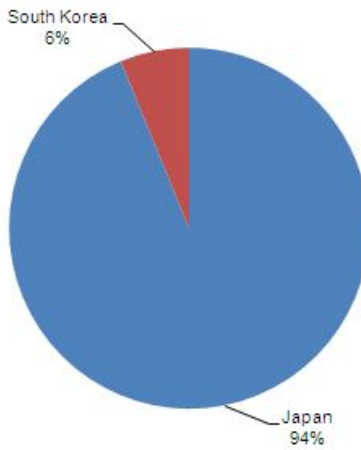
Source: China Customs & CCM

Figure 7: Export destinations of China's lithium ferrous phosphate by volume, Dec. 2014



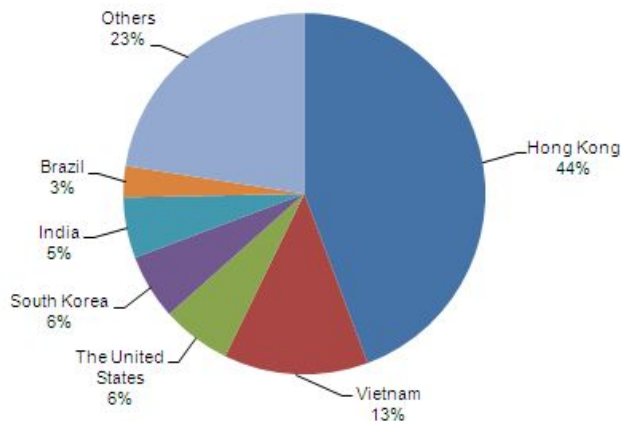
Source: China Customs & CCM

Figure 8: Export destinations of China's lithium nickel cobalt manganate by volume, Dec. 2014



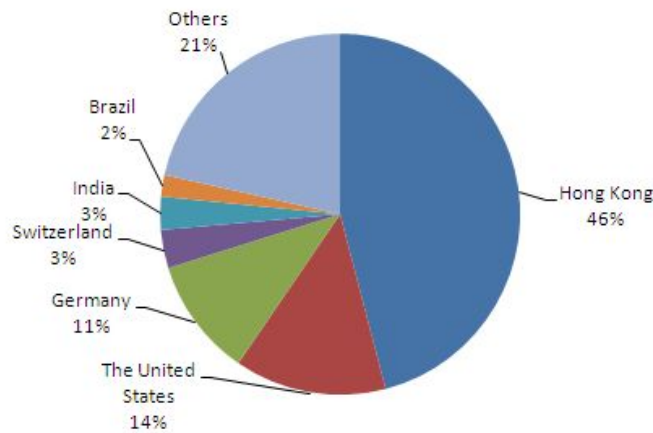
Source: China Customs & CCM

Figure 9: Export destinations of China's Li-ion storage battery by volume, Dec. 2014



Source: China Customs & CCM

Figure 10: Export destinations of China's Li-ion primary battery and primary battery pack by volume, Dec. 2014



Source: China Customs & CCM

Price Update

Ex-works prices of major Li-ion battery materials in China in Feb. 2015

Table 9: Ex-works prices of major Li-ion battery materials in China in Feb. 2015

Product	Ex-works price in Feb. 2015		Ex-works price in Jan. 2015		MoM change
	USD/t	RMB/t	USD/t	RMB/t	
Battery grade lithium carbonate (low-end)	6,827	41,900	6,537	40,000	4.75%
Battery grade lithium carbonate (high-end)	7,007	43,000	6,700	41,000	4.88%
Lithium cobaltate (LCO)	28,244	173,333	28,180	172,433	0.52%
Lithium manganate (LMO)	7,333	45,000	7,354	45,000	0.00%
Lithium ferrous phosphate (LFP)	15,022	92,188	14,972	91,613	0.63%
Lithium nickel cobalt manganate (NCM)	21,125	129,643	20,991	128,443	0.93%
Electrolyte	8,262	50,702	8,476	51,865	-2.24%
Artificial graphite (powder)	9,858	60,500	9,806	60,000	0.83%
Product	Ex-works price in Feb. 2015		Ex-works price in Jan. 2015		MoM change
	USD/m ²	RMB/m ²	USD/m ²	RMB/m ²	
Separator (wet process)	1.31	8.03	1.29	7.90	1.65%
Separator (dry process)	0.96	5.90	0.96	5.90	0.00%

Source: CCM

Flash News

Beijing Easpring puts Li-ion battery cathode material plant into massive production

On 3 Feb., 2015, Beijing Easpring Material Technology Co., Ltd. (Beijing Easpring) announced that it had put a new Li-ion battery cathode material plant located in Haimen City, Jiangsu Province into massive production, product for Chinese clients. Beijing Easpring took international advanced technology as reference in the design and construction of the plant, technology ranking front in China.



Tianjin DG puts Li-ion battery separator production line into operation

On 10 Feb., 2015, Tianjin DG Membrane Tech Co., Ltd. (Tianjin DG) announced that its 30 million m²/a Li-ion battery separator production line had been officially put into operation.

This is the first phase in Tianjin DG's Li-ion battery separator project. The other 200 million m²/a production line will be constructed in the second phase. Supercritical fluid extraction (SFE) process with completely independent intellectual property right is adopted in this project.

Jungheinrich launches new-generation Li-ion battery

On 11 Feb., 2015, Jungheinrich AG (Jungheinrich) announced to launch 2 new-generation Li-ion batteries, capacity being 240 Ah and 360 Ah respectively. Both will be used to substitute lead-acid battery installed in the electric trunk and electric fork-lift truck manufactured by the enterprise.

Jungheinrich would adopt intelligent battery management system and fast charging technology based on the fast charging equipment. It is revealed that the new-generation Li-ion batteries can be fully charged within 1.5 hours.



Journalist: Stanely Wang, Duanxian Ye, Zhiqiang Liu
Editor: Jenny Xing
Chief Editor: Alan Lu
Publisher: Guangzhou CCM Information Science & Technology Co.,Ltd

CCM's legal disclaimers

1. CCM guarantees that the information in the report is accurate and reliable to the best of its knowledge and experience. CCM defines the report as a consulting product providing information and does not guarantee its information is completely in accordance with the fact. CCM shall not have any obligations to assume any possible damage or consequences caused by subscribers' any corporate decisions based upon subscribers' own understanding and utilization of the report.

2. The complete copyright of the report is and will be held by CCM. Subscribers shall not acquire, or be deemed to acquire the copyright of the report.

3. The report provided by CCM shall be only used as source of subscriber's internal business decisions and shall not be used for any other purposes without CCM's prior written consent, unless stated and approved in license contracts signed by both parties. Subscribers shall not distribute, resell and disclose the whole report or any part of the report to third parties and shall not publish any article or report by largely or directly copying or citing the information or data based on CCM's report without the prior written consent of CCM.

4. **"Single User License"** means that there shall be only ONE person to receive, access and utilize the report. Subscriber can present the content of the report that marked the source from CCM to their internal colleagues for their internal communication and utilization, but cannot share the whole report to other individuals. Any citation, distribution, reselling and disclosure of the report as well as its partial content to any third party are prohibited, including but not limited to their parent companies or subsidiaries.

5. **"Corporate License"** means that subscriber shall not cite, distribute, resell the report or disclose information of the report to any third party without CCM's prior written consent, except subscribers' affiliates controlled with ownership of more than 50% of shares.

Guangzhou CCM Information Science & Technology Co., Ltd.

Any publication, distribution or copying of the content in this report is prohibited.

17th Floor, Huihua Commercial & Trade Building, No.80 XianlieZhong Road Guangzhou, 510070, P.R.China

Tel: +86-20-37616606

Fax: +86-20-37616768

E-mail: econtact@cnchemicals.com

Website: www.cnchemicals.com