

# Bio-based Material Quarterly Newsletter

Q1 2024

Issue 1 March 30 2024



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## Headline

On 29 Feb., China issued the 2024 Directory for Guiding Green and Low-Carbon Transformation of Industries and Guiding Opinions on Accelerating Green Development of Manufacturing Industries, promoting use of bio-based materials.

Cathay Biotech forecasted 13.39% and 35.32% drops in revenue and total profit in 2023, with increased R&D funds in bio-based products; its 500,000 t/a bio-based PDA and 900,000 t/a bio-based PA project is delayed for startup to 31 Dec., 2025.

Zhongke Biotech posted forecasts for 2023, with a widening net loss in the range of -USD70.36 million (-RMB500 million) to -USD49.25 million (-RMB350 million), down by 147.38% to 253.40% YoY.

Hisun Biomaterials reported top line growth of 24.43% in contrast to the 7.41% decline in net profit in 2023, with the production and sales volume of pure polylactic acid (PLA) up by 52.62% and 76.24% YoY, respectively.

In Q1, there are three succinic acid (SA)-related project updated progresses, accounting for 50,000 t/a bio-based SA by Huaheng Biotech, 100,000 t/a SA by Liaoning Kingfa, and 3,000 t/a SA by Xingguang Biotech.

In Q1, there are lactide and polylactic acid (PLA)-related projects updated progresses, ie. COFCO Biotech's 30,000 t/a lactide project, Jiangxi Keyuan's 200,000 t/a lactic acid and 130,000 t/a PLA project (phase I), and Linyi Xinyuan's 300,000 t/a PLA project; and Shanghai Tong-Jie-Liang's 200,000 t/a PLA project is signed to settle in Quanzhou.

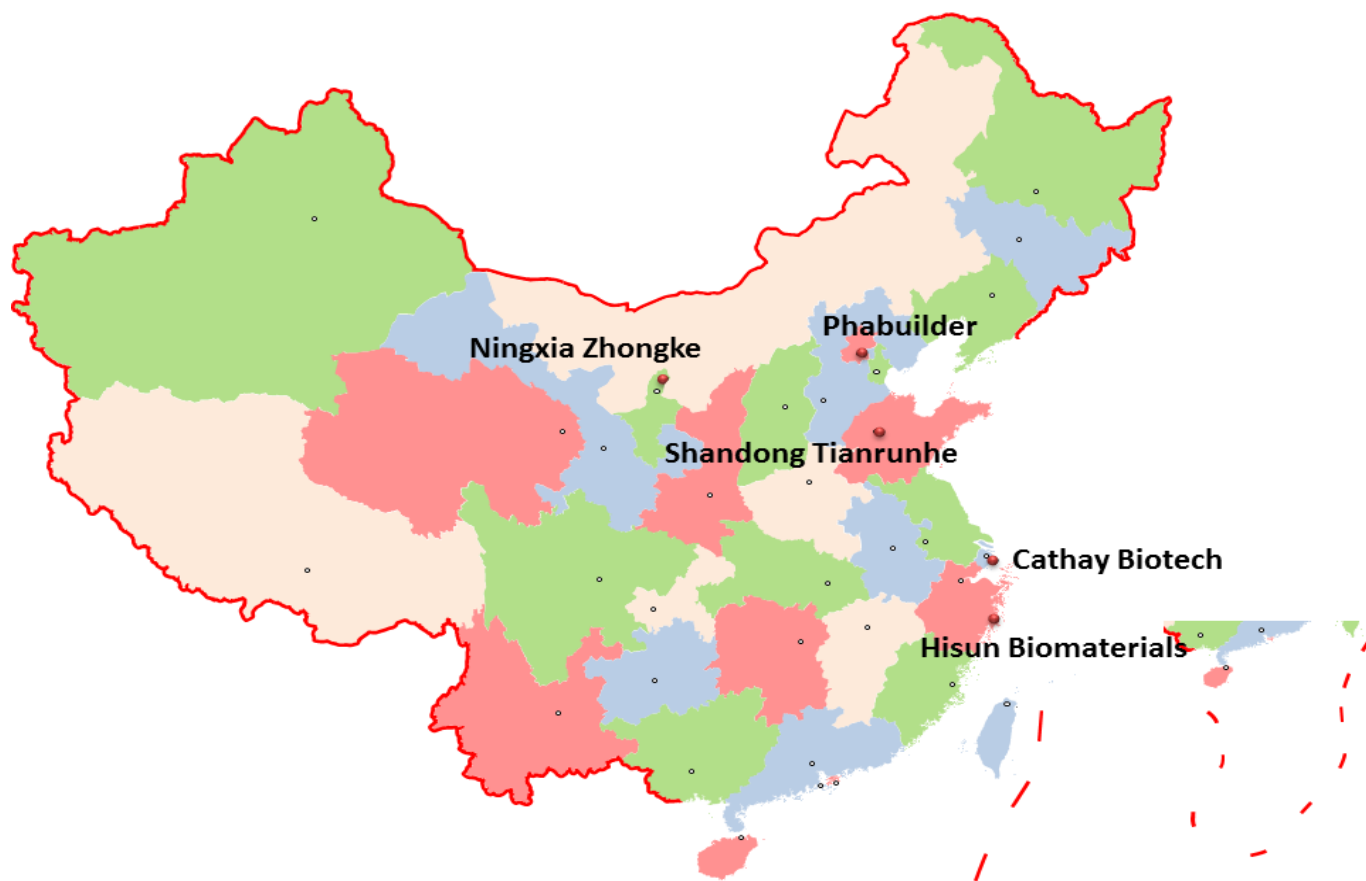
In Q1, Phabuilder raised two projects to build 30,000 t/a and 2,000 t/a PHA production in Yichang of Hubei and Ili of Xinjiang.

On 1 March, Shandong Tianrunhe was given a greenlight on its 15,000 t/a 1,3-PDO and derivatives project.

There are updates on Lyocell fibre projects in China recently: Nanjing Chemical Fibre's 40,000 t/a project entered operation, Baoding Swan's upgrading project proposal was disclosed, and Genertec Advanced Materials' 10,000 t/a flame-retardant Lyocell production line started up.

On 16 Jan., Guangxi Anhongda published 1st phase details of its 500,000 t/a mulberry branch-derived functional fibre project in Hechi of Guangxi.







## Editor's Note

Welcome to the Bio-based Material Quarterly Newsletter Q1 2024.

### Policy

In Q1, China issued the *2024 Directory for Guiding Green and Low-Carbon Transformation of Industries* and *Guiding Opinions on Accelerating Green Development of Manufacturing Industries*, to facilitate bio-based sectors' development.

### Market dynamics & company performance

Cathay Biotech expected declines in both revenue and profit in 2023; Zhongke Biotech warned of a larger net loss for the year; while Hisun Biomaterials reported over 50% growth in pure polylactic acid (PLA) production and sales, despite rising revenue and falling profit.

There are updates in PLA-related capacity construction, including COFCO Biotech's 30,000 t/a lactide project, Jiangxi Keyuan's 200,000 t/a lactic acid and 130,000 t/a PLA project (phase I), and Linyi Xinyuan's 300,000 t/a bio-based new material (PLA) project, and Shanghai Tong-Jie-Liang's 200,000 t/a PLA project.

In the succinic acid (SA) manufacturing, Huaheng Biotech started continuous production for bio-based SA and 1,3-propanediol (1,3-PDO); Liaoning Kingfa, Xingguang Biotech and Shandong Xiaowei announced progresses in pushing their construction.

In addition, Phabuilder plans to build up PHA capacity, 30,000 t/a in Yichang of Hubei and 2,000 t/a in Ili of Xinjiang. Shandong Tianrunhe was approved for its 15,000 t/a 1,3-PDO and derivatives project; Nanjing Chemical, Baoding Swan and Genertec Advanced Materials gained progresses in their Lyocell fibre projects; Guangxi Anhongda is pushing forward 1st phase of 500,000 t/a mulberry branch-derived fibre project; Xinxiang Chemical disclosed plan to add 30,000 t/a biomass-derived cellulose fibre capacity in Xinjiang; Tongling Leaf is to build 20,000 t/a production line for FCDA and the downstream materials; Zhongke Qichen's 100,000 t/a bamboo fibre construction project was given a greenlight for construction; and Huangpu Institute of Green Advanced Materials' 1,000 t/a bio-based polyester elastomer (BPE) pilot project entered second publication. Also, Zhongke Baiyijin gathered RMB10+ million funding to scale up 1,3-PDO production, and technical development and marketing for ethylene glycol (EG); Zhuhai MedPHA raises RMB10 million+ to fast track R&D, production and sale of PHA pipeline products.

### Price

In Q1, PLA and PHA prices have remained stable.

The USD/CNY exchange rate in this newsletter is USD1.00=CNY7.1059, sourced from the People's Bank of China on 1 March, 2024.

Unless otherwise specified, all the prices mentioned in this newsletter will include the VAT.





## Governmental Direction

### China's 2024 guidelines for green transformation of industries

Summary: On 29 Feb., China issued the *2024 Directory for Guiding Green and Low-Carbon Transformation of Industries* and *Guiding Opinions on Accelerating Green Development of Manufacturing Industries*, promoting use of bio-based materials.

On 29 Feb., the National Development and Reform Commission, Ministry of Industry and Information Technology (MIIT), Ministry of Natural Resources, Ministry of Ecology and Environment and other government bodies jointly issued the ***2024 Directory for Guiding Green and Low-Carbon Transformation of Industries (the Directory)***. The Directory centres on new models and growth drivers for green development and transformation of industries. It highlights key industrial sectors and specifies requirements for energy saving and carbon reduction, environmental protection, resource recycling, green-oriented transition of energy, ecological protection, restoration and utilisation, infrastructure upgrading for environmental friendliness and green services, etc.

The encouraged industries/services therein include the followings:

- **Production of non-toxic and non-hazardous raw materials/products and alternative uses:** including the production and use of non-toxic and non-hazardous or low-toxic and low-hazardous raw materials that are used in key industries such as electrical and electronic appliances, automobile, coating, furniture, printing, rubber products, leather, shoes; the production and use of alternative raw materials or alternative products to raw materials that contain toxic and hazardous substances, such as heavy metals or organic pollutants; and the production and use of non-toxic and non-hazardous or low-toxic and low-hazardous products. The examples are the manufacturing of clean packaging materials and the production and use of degradable plastic products.
- **Comprehensive utilisation of agricultural and forestry wastes:** including raw materials utilisation like collection, storage and transportation, curing and moulding of straw and other non-food biomass, production of environmentally-friendly paper board materials, paper pulp, bio-based materials; in particular, the production of bio-based materials such as polylactic acid (PLA) and polyhydroxyalkanoates (PHA) through processes of saccharification, and separation, purification and concentration of fermented products, utilisation of straw for energy supply, and the resource utilisation of straw and other agricultural residual materials
- **Green agricultural production:** manufacturing of standard agricultural film and environmentally-friendly biodegradable film, emission reduction of methane in paddy fields, emission reduction of nitrous oxide in farmland, carbon sequestration by returning straw to the fields, and energy saving and emission reduction of agricultural machinery
- **Bamboo industry:** including research and development of good bamboo varieties, cultivation, harvesting and processing, "replacing plastics with bamboo" and comprehensive use of the resources
- **R&D and promotion of green technologies and products:** including R&D and verification of technologies and products in the fields of energy conservation and carbon reduction, environmental protection, resource recycling, green and low-carbon transformation of energy, ecological protection, restoration and utilisation. For example, certification and promotion of green products such as artificial boards and wooden floors, coatings, thermal insulation materials, waterproof and sealing materials, ceramic tiles (boards), textile products, wood-plastic products, paper and paper products, plastic products, detergents, refrigerators, air conditioners and washing machines, tyres, and courier packaging supplies.

#### ***Guiding Opinions on Accelerating Green Development of Manufacturing Industries***

On the same day, MIIT released the *Guiding Opinions on Accelerating Green Development of Manufacturing Industries*, suggesting to leverage the strengths of bio-manufacturing. That includes to give full play to the environmentally-friendly features of strong selectivity, high production efficiency and less waste, with focus on fermentation in light industry, medicine, chemical, agriculture, food and other industries; and to set up systems for innovative bio-manufacturing of core strains and key enzymes. It also mentions the importance of





improving the efficiency and reducing cost in the life cycle of CCUS (carbon capture, utilisation and storage) technology, and carrying out R&D and demonstration of technology results, such as the coupling of CCUS with industrial processes and the bio-transformation of carbon dioxide.







## Market Analysis

### Cathay Biotech projects profit down over 30% in 2023

Summary: Cathay Biotech forecasted 13.39% and 35.32% drops in revenue and total profit in 2023, with increased R&D funds in bio-based products; its 500,000 t/a bio-based PDA and 900,000 t/a bio-based PA project is delayed for startup to 31 Dec., 2025.

On 23 Feb., Cathay Biotech Inc. (Cathay Biotech, stock code: 68806.SH) released the Preliminary Earnings Estimate for 2023. Key data are as follows:

- Revenue: USD297.52 million (RMB2.11 billion), down by 13.39% YoY
- Total profit: USD63.35 million (RMB450.17 million), down by 35.32% YoY
- Net profit attributable to equity shareholders of the listed company: USD51.65 million (RMB367.04 million), down 33.66% YoY

Although Cathay Biotech has maintained its leading position in the global market, as it explained, sales and gross margins from its long-chain dibasic acid (LCDA) products were impacted by the fluctuating international market and industry, and gains from foreign exchange differences were reduced due to the volatility of the USD and RMB exchange rates during the period. The company has also continued to increase investment in research and development of bio-based material application, processing equipment, and technologies. It has made progress in commercialising its bio-based polyamide (PA) products through collaboration with leading downstream operators.

#### Product innovation

In 2023, Cathay Biotech tested the innovative "one-step" preparation method of bio-based high-temperature PA in 5,000 t/a pilot production, solving technical problems of traditional high-temperature nylon production such as high energy and time consumption, material flow inefficiency, easy degradation and yellowing. The company plans to commercialise high-performance bio-based thermoplastic fibre composites made from high-temperature PA in the transport and logistics, new energy equipment and construction sectors, with a commitment to "replace thermosets with thermoplastics, aluminium with plastics and steel with plastics".

It has also developed bio-based LCDAs derived from plant-derived alkanes, which it supplies to green dibasic acid customers. Compared with LCDAs made from petrochemical alkanes, Cathay Biotech's plant-based LCDAs have lower carbon emissions and improve the company's overall competitiveness in the market.

#### Major partnership

In June 2023, Cathay Biotech announced a capital increase plan with China Merchants Group Co., Ltd. as a new shareholder, and signed a strategic agreement to conduct pilot marketing programmes for bio-based PA and the composite materials for textiles, shipping containers, refrigerator trucks, building and bridge structural components, etc.

In Jan. 2024, it and 3P Corporate (a South Korea company renowned for its extensive simulation expertise) found a joint venture, which focuses on advancing the development of bio-based PA thermoplastic composites tailored for critical applications such as hydrogen storage and transportation, urban air transport, and wind turbine blades.







## Project update

On 13 March, 2024, Cathay Biotech notified that it has delayed the start-up of the 500,000 t/a bio-based PDA and 900,000 t/a bio-based PA project to 31 Dec., 2025 from the previously planned date of 31 Dec., 2024, as it has decided to prioritise the construction of part of the designed capacity and advance production in a phased manner. The change is made to improve the company's benefit, given the consideration that the supporting infrastructure of the park where the project is located should be built in stages, and it will take time for the market to digest such new production.

## Ningxia Zhongke expects 2023 net loss to widen

Summary: Zhongke Biotech posted forecasts for 2023, with a widening net loss in the range of -USD70.36 million (-RMB500 million) to -USD49.25 million (-RMB350 million), down by 147.38% to 253.40% YoY.

On 30 Jan., Ningxia Zhongke Biotechnology Co., Ltd. (Zhongke Biotech, Stock Code: 600165) released profit warning for 2023. Key data are as follows:

- Net loss: -USD70.36 million (-RMB500 million) to -USD49.25 million (-RMB350 million), down by 147.38% to 253.40% YoY, from the -USD19.91 million (-RMB141.48 million) of 2022
- Net profit attributable to equity shareholders of the parent excl. extraordinary gains/losses: -USD70.36 million (-RMB500 million) to -USD49.25 million (-RMB350 million), compared with the -USD19.76 million (-RMB140.41 million) of 2022

On 31 Jan., Zhongke Biotech received a regulatory inquiry from the Shanghai Stock Exchange for the company's estimate of such loss. In its reply letter, Zhongke Biotech expected a 60.21% decline in revenue from main business to USD38.14 million (RMB271 million), with gross margins down by 33.49 percentage points to -22.38% in 2023. It pointed out that there was a sharp drop in the margin of long-chain dibasic acid (LCDA), which came down to two fronts:

- Its subsidiary, Ningxia Zhongke Biochemical Material Co., Ltd. (Zhongke Biochemical) lacked sufficient liquidity to run at full capacity and the fixed costs per unit were high; margins were also threatened by the lower selling price and the increased material consumption per unit.
- Inventory and fixed assets were written down by approximately USD19.70 million (RMB140 million), together with the increased financial costs after repayment of the interests on borrowings.

### LCDA production operation from 2022 to present:

- In 2022, Zhongke Biotech's LCDA capacity utilisation rate was 30%–60% in Jan.–July. The operation entered maintenance in Aug.–Nov., and started test and validation of production line in Dec., with a capacity utilisation of 1.52% at the time.
- Into Jan. 2023, test and validation work continued, with capacity utilisation of 3.33% in the month. In late March, Jinan Changyue New Material Technology Industry Partnership Enterprise (Limited Partnership)'s default on paying USD42.22 million (RMB300 million) of capital increase sunk Ningxia Zhongke into the financial mire. Ningxia Zhongke was forced to suspend production activities in early April. It later received one-year government bailout of up to USD11.26 million (RMB80 million) and resumed production in July, with capacity utilisation rising to 2.86% in Aug., 12.02% in Sept., 18.44% in Oct., and 11.51% in Nov.
- Since 10 Nov., 2023, in response to the problem of high production costs, the company has initiated routine overhaul and a series of measures to reduce costs; and has resumed regular production since 5 Jan., 2024.

However, Zhongke Biotech is uncertain whether it will be able to emerge from its current predicament, saying that its business is affected by multiple factors: limited government aid, staffing problems due to delayed payroll, inconsistent product quality, high production costs,





unstable production and supply, weak market competitiveness.

**TABLE 1: Segment performance, 2023 vs 2022**

Segment	Item	2023	2022	Change
Long-chain dibasic acid (LCDA)	Sales volume, tonne	2,112.98	15,191.98	-86.09%
	Sales revenue, USD million	7.35	62.56	-88.25%
	Operating cost, USD million	17.36	52.18	-66.74%
	Gross margins	-136.10%	16.59%	down 152.69 percentage points
Coal-based activated carbon	Sales volume, tonne	16,914.49	16,626.53	1.73%
	Sales revenue, USD million	30.81	33.04	-6.77%
	Operating cost, USD million	29.34	32.8	-10.56%
	Gross margins	4.76%	0.72%	up 4.04 percentage points

Source: Zhongke Biotech

### Hisun Biomaterials reports pure PLA sales up over 50% in 2023

Summary: Hisun Biomaterials reported top line growth of 24.43% in contrast to the 7.41% decline in net profit in 2023, with the production and sales volume of pure polylactic acid (PLA) up by 52.62% and 76.24% YoY, respectively.

On 26 March, Zhejiang Hisun Biomaterials Co., Ltd. (Hisun Biomaterials, stock code: 688203.SH) disclosed its 2023 annual report.

#### Key data for 2023:

- Revenue: USD106.01 million (RMB753.32 million), up 24.43% YoY
  - sales from main business up 24.18%, mainly driven by the 53.50% increase in pure polylactic acid (PLA).
- Net profit attributable to parent company: USD6.13 million (RMB43.55 million), down by 7.41%
- Net profit after excl. extraordinary gains/losses: USD5.67 million (RMB40.32 million), up 21.73%, due to the increased government grants and other non-recurring gains

Hisun Biomaterials explained the mixed performance that:

- In 2023, it adjusted its marketing strategy to confront the macroeconomic impacts and intensified market competition, leading to a 42.48% growth in the sales volume of PLA resin (pure PLA + modified PLA compound), but the annual revenue was affected by the reduced product selling prices.
- Domestic market saw substantial growths in straws, extruded sheets, film bags and fibres with the progressive implementation of the plastic ban, driving in particular the PLA resin sales and accounted for 85.5% of Hisun Biomaterials' total revenue
- Overseas market faced with contractions in Japan and South Korea due to local policy adjustments, economic downturn and other impacts; while with the development of EU-wide ban on plastics products and the US's *Executive Order on Advancing Biotechnology and Biomanufacturing Innovation for a Sustainable, Safe, and Secure American Bioeconomy*, there were recoveries in the European and U.S. markets. Revenue from outside Chinese mainland accounted for around 14.5% of the total.





### Production and construction

At present, Hisun Biomaterials has a total of 65,000 t/a pure PLA capacity.

- Its subsidiary, Zhejiang Honor Biomaterials Co., Ltd. (Honor) has one 20,000 PLA production line entered full-capacity operation in 2023, which is the 2th phase construction of its 50,000 t/a PLA production project.
- Its subsidiary, Zhejiang Haichuangda Biomaterials Co., Ltd. (Haichuangda), has completed construction for main buildings according to the 150,000 t/a PLA project in 2023, the phase I of which includes one 75,000 t/a PLA production line is due for completion in March 2025.





TABLE 2: Financial data by focused sector, products, region and distributions in 2023

By sector						
Sector	Revenue, million USD	YoY Change	Operating cost, million USD	YoY Change	Gross margin ratio	YoY Change
Fibre manufacturing	104.47	24.18%	90.85	25.13%	13.04%	down 0.66 percentage point
By product						
Product	Revenue, million USD	YoY Change	Operating cost, million USD	YoY Change	Gross margin ratio	YoY Change
Pure PLA	76.5	53.50%	65.24	51.56%	14.72%	up 1.09 percentage points
Modified PLA	27.61	-17.38%	25.29	-12.01%	8.42%	down 5.59 percentage points
Primary products	0.36	-59.00%	0.31	-61.25%	11.90%	up 5.12 percentage points
By region						
Region	Revenue, million USD	YoY Change	Operating cost, million USD	YoY Change	Gross margin ratio	YoY Change
Chinese mainland	89.35	27.86%	77.83	29.60%	12.89%	down 1.17 percentage points
Outside Chinese mainland	15.13	6.12%	13.02	3.75%	13.94%	up 1.97 percentage points
By distribution						
Distribution channel	Revenue, million USD	YoY Change	Operating cost, million USD	YoY Change	Gross margin ratio	YoY Change
Direct distribution	89.97	29.37%	78.01	30.57%	13.28%	down 0.80 percentage point
Distributor	14.51	-0.56%	12.83	-0.15%	11.54%	down 0.37 percentage point

Source: Hisun Biomaterials' Annual Financial Report for 2023





TABLE 3: Production and sales of PLA resin in 2023, tonne

Main products	Output	YoY Change	Sales volume	YoY Change	Year-end inventory	YoY Change
Pure PLA	39,478.55	52.62%	29,707.81	76.24%	5,438.53	54.82%
Modified PLA compound	11,785.05	-15.22%	12,081.18	-3.15%	1,016.37	-41.88%

Note:1. The output of pure PLA resin was boosted as a result of PLA production ramp-up in Honor and to prepare for the rise in sales order intake during the reporting period; consequently, the ending inventory increased.

2. Hisun Biomaterials' PLA production is used in internal product production and R&D, and is available for sale. In 2023, 8,281.28 tonnes of its PLA were consumed internally.

Source: Hisun Biomaterials' Annual Financial Report for 2023

### Succinic acid project updates in Q1 2024

Summary: In Q1, there are three succinic acid (SA)-related project updated progresses, accounting for 50,000 t/a bio-based SA by Huaheng Biotech, 100,000 t/a SA by Liaoning Kingfa, and 3,000 t/a SA by Xingguang Biotech.

In Q1, there are three succinic acid (SA)-related project updated progresses.

**Anhui Huaheng Biotechnology Co., Ltd. (Huaheng Biotech, stock code: 688639.SH)** announced successful continuous production for 50,000 t/a bio-based SA and 50,000 t/a 1,3-propanediol (1,3-PDO) in mid-March, marking an important milestone in the company's foray into the bio-based materials industry.

#### Overview of the SA project:

- Construction nature: Reconstruction
- Executive entity: Chifeng Huaheng Synthetic Biotechnology Co., Ltd.
- Total investment: USD119.55 million (RMB849.51 million), 1.03% (=USD1.23 million/RMB8.77 million) of which for environmental protection
- Location: Tianyi Town, Ningcheng County, Chifeng City
- Construction content: Reconstruct facility and expand the original 300,000 t/a corn processing capacity to 600,000 t/a corn processing, build a new plant for bio-based SA and its salts using synthetic biotechnology
- Product plan: Corn starch (200,000 t/a), SA (48,400 t/a), sodium succinate (3,000 t/a), bacterial proteins (5,000 t/a), soil conditioner (10,000 t/a)

#### Overview of the 1,3-PDO project:

- Construction nature: New construction
- Executive entity: Chifeng Zhihe Biotechnology Co., Ltd.
- Investment: USD55.91 million (RMB397.33 million), 0.78% (=USD0.44 million/RMB3.10 million) of which for environmental protection
- Location: Tianyi Town, Ningcheng County, Chifeng City
- Construction content: Build plant and production equipment, including fermentation workshop, purification workshop
- Product plan: 1,3-PDO (50,000 t/a)

**Liaoning Kingfa Biomaterial Co., Ltd. (Liaoning Kingfa)** had the 100,000 t/a SA project underwent a second publication with an environment impact report on 14 March.



**Project details:**

- Construction nature: New construction
- Total investment: USD140.72 million (RMB999.96 million), 4.37% (=USD6.15 million/RMB43.69 million) of which for environmental protection
- Location: Panjin Liaobin Coastal Economic and Technological Development Area, Liaoning Province
- Site area: 123,432 m<sup>2</sup>
- Construction content: Two 50,000 t/a SA production lines and the supporting facilities; the project is divided into two phases, each designed to build 50,000 t/a capacity.
- Staffing: 400 employees (200 for each phase)
- Working system: Employees work in four shifts and three running systems, totalling 340 days or 8,160 hours per year
- Construction period: Phase I construction to start in April 2024 and Phase II in 2026
- Meanwhile, Liaoning Kingfa has three related projects under construction in the location: 10,000 t/a bio-based 1,4-butanediol (Bio-BDO) project to start operation in 2024; 50,000 t/a L-lactic acid project to start operation in 2024; and 5,000 t/a halogen-free, green flame retardant project

Anhui Xingguang Biotechnology Co., Ltd. (Xingguang Biotech) was approved for construction of the 15,000 t/a lactic acid (LA) and 5,000 t/a acid mixture project on 19 Jan.

**Project details:**

- Construction nature: Reconstruction
- Investment: USD7.74 million (RMB55 million), 0.54% (=USD42,218/RMB300,000) of which for environmental protection
- Location: Economic Development Zone of Guzhen County, Bengbu City, Anhui Province
- Site area: 6.6 hm<sup>2</sup>, no extra land taken
- Construction content: Technical transformation is based on the company's existing ferric phosphate (FePO<sub>4</sub>) line and to install a series of production equipment
- Designed capacity:
  - Main products: LA (15,000 t/a) and acid mixture (5,000 t/a)
  - By products: SA (3,000 t/a) and calcium malate (3,000 t/a)

### Lactide and PLA project updates in Q1 2024

Summary: In Q1, there are lactide and polylactic acid (PLA)-related projects updated progresses, ie. COFCO Biotech's 30,000 t/a lactide project, Jiangxi Keyuan's 200,000 t/a lactic acid and 130,000 t/a PLA project (phase I), and Linyi Xinyuan's 300,000 t/a PLA project; and Shanghai Tong-Jie-Liang's 200,000 t/a PLA project is signed to settle in Quanzhou.

In Q1, there have developments in a number of lactide and polylactic acid (PLA)-related projects.

On 12 March, **COFCO Biotechnology Co., Ltd. (COFCO Biotech, stock code: 000930.SZ)** stated on the investor interaction platform that its subsidiary COFCO Biomaterial (Yushu) Co., Ltd. has completed and installed the main structures and auxiliary equipment according to the project plan for 30,000 t/a lactide, with full sets of imported production equipment to be installed.

**Project overview:**

- Construction nature: New construction
- Location: Wukeshu Economic and Technological Development Zone, Yushu City (county-level), Changchun City, Jilin Province
- Total investment: USD82.60 million (RMB586.94 million)





- Site area: 42,657.87 m<sup>2</sup>
- Construction content: Based on some existing auxiliary facilities and utilities of COFCO Biomaterial (Yushu), to build a new lactide production workshop and production line, tank farms, warehouses and other facilities
- Designed capacity: 30,000 t/a of lactide and 2,680 t/a of industrial-grade lactic acid/LA (by-product)
- Commencement of construction work: Sept. 2022

On 30 Jan, **Jiangxi Keyuan Bio-Material Co., Ltd. (Keyuan)** notified to start coordinated trial operation of installed systems of the 200,000 t/a LA and 130,000 t/a PLA project (phase I).

#### Overview of the 200,000 t/a LA and 130,000 t/a PLA project:

- Construction nature: New construction
- Location: Chemical Fibre Industrial Base of Lianxi District, Jiujiang City, Jiangxi Province
- Investment: USD419.69 million (RMB2.98 billion), 3.50% (USD14.67 million/RMB104.25 million) of which for environmental protection
- Designed capacity:
  - Phase I: 100,000 t/a LA, 40,000 t/a PLA (30,000 t/a high-gloss pure PLA + 10,000 t/a low-gloss pure PLA), and 100,000 t/a gypsum plaster
  - Phase II: 100,000 t/a LA, 100,000 t/a high-gloss pure PLA, 100,000 t/a gypsum plaster; this phase will also transform the 30,000 t/a high-gloss pure PLA line (of the phase I) into a 20,000 t/a low-gloss pure PLA line
- Construction period:
  - Phase I: Construction started in Oct. 2022
  - Phase II: Construction to start in 2024

On 15 Jan., **Linyi Xinyuan New Material Technology Co., Ltd. (Linyi Xinyuan)** broke ground for the 300,000 t/a bio-based new material (PLA) project in Linshu Economic Development Zone. This project accounts for a budget of USD703.64 million (RMB5 billion) and two-phased construction over an area of 40 ha. The Phase I covers an area of 21 ha and includes 13 production workshops for thermal charcoal regeneration, LA concentration, hydrolysis and recovery, as well as supporting facilities like natural gas cogeneration station and wastewater treatment station; Phase I is designed to produce 30,000 t/a fulvic acid, 150,000 t/a LA, 100,000 t/a PLA, and 150,000 t/a modified PLA from straw via advanced fermentation process, due for completion in 2025 and expected to generate an annual output value exceeding USD422.18 million (RMB3 billion) once in full operation. Linyi Xinyuan was founded in Oct. 2023 with a registered capital of RMB35 million.

On 8 Jan., **Shanghai Tong-Jie-Liang Biological Materials Co., Ltd. (Shanghai Tong-Jie-Liang)** signed a contract with the local government of Huian County, Quanzhou City, Fujian Province for a 200,000 t/a PLA production project. Shanghai Tong-Jie-Liang have one plant in Anhui operated by Ma'anshan Tong-Jie-Liang Biomaterials Co., Ltd. with one 10,000 t/a PLA line in operation, and one plant in Shandong operated by Shandong Tongbang New Materials Technology Co., Ltd. with one project under construction for 300,000 t/a LA, 200,000 t/a PLA and 100,000 t/a PLA fibre (phase I: 150,000 t/a LA, 100,000 t/a PLA and 50,000 t/a PLA fibre) due for completion in 2024.







## Company Dynamics

### Phabuilder scaling PHA operation

Summary: In Q1, Phabuilder raised two projects to build 30,000 t/a and 2,000 t/a PHA production in Yichang of Hubei and Ili of Xinjiang.

In Q1, Beijing Phabuilder Biotechnology Co., Ltd. (Phabuilder) brought forward projects to set up two polyhydroxyalkanoates (PHA) production sites, respectively in Yichang City of Hubei Province and Ili of Xinjiang Uygur Autonomous Region.

#### 1. 30,000 t/a PHA Green Manufacturing Project (Phase I) in Yichang, Hubei

The project was proposed and published by Angel Yeast Co., Ltd. (Angel Yeast, stock code: 600298.SH) on 5 Feb., to be undertaken by Hubei Weiqi Biotechnology Co., Ltd. (Weiqi Biotech). Weiqi Biotech is a joint company set up in Sept. 2022 with a registered capital of RMB100 million, 60% owned by Phabuilder and 40% by Angel Yeast. It has completed pilot-scale production of PHA and product verification.

Overview of the phase I:

- Investment: USD35.18 million (RMB250 million), USD14.07 million (RMB100 million) of which will be self-funded and USD21.11 million (RMB150 million) from financing
- Location: Southern Industrial Zone of Xiaoting District, Yichang City
- Construction content: Build 10,000 t/a production line and the supporting facilities, including fermentation and extraction workshop, drying and granulation workshop, raw material and product storehouse, and public utilities
- Construction period: 14 months; starting up in 2025

#### 2. Co-funded Project of PHA Production Site in Ili, Xinjiang

On 11 Jan., Phabuilder and Ili Chuanning Biotechnology Co., Ltd. (Chuanning Biotechnology, stock code: 301301.SZ) signed a strategic partnership agreement agreeing to build a joint company named Ili Weining Biotechnology Co., Ltd. (Weining Biotechnology, registered with a capital of RMB50 million, 51% from Phabuilder and 49% from Chuanning Biotechnology). Phabuilder's and Chuanning Biotechnology's years of research and experience in PHA and biomedicine will help the joint company achieve innovation and large production of PHA products for medical use.

Weining Biotechnology is located in Ili Kazak Autonomous Prefecture, the location selected for its close proximity to and possession of resources endowment, location advantages, and industrial establishments good for large-scale PHA production, according to the agreement. Their cooperation starts with Chuanning Biotechnology agreeing to provide no less than 2,000 tonnes of PHA to global market annually based on its existing facilities.

Chuanning Biotechnology is founded in 2010 and went public on Shenzhen Stock Exchange (SSE) at the end of 2022. It focuses on R&D and commercialisation of bio-fermentation and synthetic biotechnology and it is one of the largest global suppliers of antibiotic intermediates.





### Cooperation with Sulzer

In addition, earlier this year, Phabuilder has entered partnership with Sulzer, a global leader in fluid engineering. The two companies is combining cutting-edge synthetic biotechnology with advanced production processes and equipment, aiming to bulk up PHA production and set a technical benchmark for the full-process production, to a level that will satisfy Phabuilder's goal of supplying for global market. This will allow Phabuilder to integrate the technology development into the planned operations in Yichang and in Xinjiang, which can increase the purity of the raw materials to add more value and meet market demand.

### Shandong Tianrunhe to build 15,000 t/a capacity for 1,3-PDO and derivatives

Summary: On 1 March, Shandong Tianrunhe was given a greenlight on its 15,000 t/a 1,3-PDO and derivatives project.

On 1 March, the Shanghe Branch of Jinan Ecological Environment Bureau approved the environmental impact report of the 15,000 t/a 1,3-propanediol (1,3-PDO) and derivatives integrated, green and low-carbon project of Shandong Tianrunhe Bio-Engineering Co., Ltd. (Shandong Tianrunhe).

#### Project details:

- Construction nature: Expansion
- Total investment: USD21.11 million (RMB150 million), 12.6% (=USD2.66 million/RMB18.88 million) of which for environmental protection
- Location: Shanghe Economic Development Zone of Jinan City
- Site area: 36,666.3 m<sup>2</sup>
- Major construction content: Build one PDO production line and fermentation tank, mixing tank and other equipment (the production will be supported by the existing facilities and fermentation units); add membrane filtration system, secondary concentration and chromatographic desalination system and other devices, and build tank areas, loading station, etc.
- Designed capacity:
  - 15,000 t/a PDO—11,732.38 t/a of industrial grade and 2,700.41 t/a of cosmetic grade (both for sale), and 241.5 t/a for biogas production
  - 12,300 t/a Bio-composite carbon sources, for sale
- Staffing: 55 employees, of which 20 newly-added
- Working system: 3 x 24-hour shifts, for 258 days in fermentation process, for 330 days in other processes or 7,920 hours per year
- Construction duration: 3 months

#### Technology application

The technology to be adopted by the project is developed by Guangdong Hengtan Technology Co., Ltd (Hengtan Technology), which extracts natural glycerol from renewable biological resources (corn, straw, etc), and obtains high-purity PDO through fermentation, separation (filtration, concentration, distillation) and other steps. The liquid nanofiltration concentrate, concentrate from heavy-component removing system, PDO distilled from batch fractionating tower that are generated during the separation process contains a large amount of organic matters which can be used as good raw materials for biogas production via anaerobic fermentation to cut energy consumption and emission.

By using advanced high-throughput screening technology and directed evolution technology, Hengtan Technology has grown a new type





of natural production strain (*Clostridium pasteurianum* G8) for 1,3-PDO. Compared with the typical *Clostridium pasteurianum* strain DSM 525, *C. pasteurianum* G8 can weaken biosynthetic pathway of lactic acid and 1-butanol and enhance the metabolic pathway enabling biosynthesis of 1,3-PDO from crude glucose with reduced formation of by-products in the process—NADH in glycerol (oxidative pathway) to 1,3-PDO is efficiently utilised. Such fermentation technique is licensed and has been applied in lab experiment and pilot-scale production to produce 1,3-PDO conforming to the industrial standard.

Shandong Tianrunhe was founded in June 2018 with a registered capital of RMB66.67 million, with business covering R&D, production and sale of microbial feed additives, microbial fertilisers and microbial environmental products.

**TABLE 4:** Project product quality standard

Item	Range
1,3-Propanediol (1,3-PDO), w/%	≥99.50
Water, w/%	≤0.50
Pt-Co/Hazen	≤10
Ultraviolet absorbance (270nm)	≤0.250
Residue on ignition, w/%	≤0.0010
Iron content, w/%	≤0.00050

*Note: HG/T 4980-2016 is applicable to industrial 1,3-propanediol produced by glycerol as raw material biological method only.*

*Source: 1,3-Propanediol for Industrial Use (HG/T 4980-2016)*

### Three Lyocell fibre projects updates in Q1

Summary: There are updates on Lyocell fibre projects in China recently: Nanjing Chemical Fibre's 40,000 t/a project entered operation, Baoding Swan's upgrading project proposal was disclosed, and Genertec Advanced Materials' 10,000 t/a flame-retardant Lyocell production line started up.

Recently three Lyocell fibre projects were announced with progresses made, respectively by Nanjing Chemical Fibre Co., Ltd. (Nanjing Chemical Fibre, stock code: 600889.SH), Baoding Swan Fiber Co., Ltd. (Baoding Swan), and Genertec Advanced Materials Group Co., Ltd. (Genertec Advanced Materials).

#### Nanjing Chemical: 40,000 t/a Lyocell Staple Fibre Project

On 3 Jan., Nanjing Chemical announced the first qualified batch had gone of the 40,000 t/a production line covering full processes from raw material (pulp) to end product (Lyocell staple fibre), which is undertaken by its subsidiary Nanjing Golden Antelope Bio-based Fibre Co., Ltd. (formerly known as Nanjing Faboer Fibre Co., Ltd).



**Project overview:**

- Construction nature: Reconstruction
- Investment: USD115.80 million (RMB822.89 million), 4.37% (=USD5.07 million/RMB36 million) of which for environmental protection
- Location: Guabu Town, Liuhe District, Nanjing City, Jiangsu Province
- Site area: 32,577 m<sup>2</sup>
- Construction content: Build production workshops, warehouses, solvent concentration workshops, tank farm, sewage treatment plants and others on the existing plant area; and purchase relevant production equipment.
- Designed capacity: 40,000 t/a Lyocell staple fibre
- Working system: 400 new employees working in 3 x 8-hour shifts for 333 days or 8,000 hours per year

Nanjing Chemical Fibre was established in 1992, formerly known as Nanjing Chemical Fibre Factory which started operation in 1964. It is mainly engaged in the production and sale of viscose fibre, Lyocell fibre and polyethylene terephthalate (PET) foaming materials. The company said it would place more focus on facilitating full-fledged operation in Lyocell fibres to boost product competitiveness and create cost advantage.

**Baoding Swan: Bio-based Lyocell Fibre Upgrading and Renovation Project**

The project was first publicised on 29 Dec., 2023, details as follows:

- Investment: USD42.81 million (RMB304.20 million)
- Location: Shunping County, Baoding City, Hebei Province
- Construction content: Purchase 212 sets of pulping machines, reactors, unloading pumps, filters, etc.; upgrade 2 existing bio-based Lyocell fibre lines; and add 1 evaporation and concentration workshop and 1 sewage treatment station
- Designed capacity: 60,000 t/a of bio-based Lyocell fibre

Baoding Swan was founded in 2015 and is now wholly owned by Hi-tech Fiber Group Corporation. It was formerly known as the state-owned Baoding Chemical Fibre Joint Factory which was founded in 1957. In 2015, the company shut down all viscose filament production lines to pursue green transformation and start to develop sustainable Lyocell fibre.

**Genertec Advanced Materials: 10,000-Tonne-Level Flame-Retardant Lyocell Fibre Project**

On 29 Dec., 2023, the project achieved successful result in its first operation. This production involved China's first operating flame-retardant Lyocell fibre line of 10,000-tonne-level. The proprietary technology adopted is independently developed by China Textile Academy (CTA), which is a subsidiary of Genertec Advanced Materials, resulting from long-term study and experiments on special flame retardant for Lyocell fibre and homogeneous and stable dispersion system, to enable industrialisation. The product of flame-retardant Lyocell fibre has excellent mechanical properties and long-lasting flame resistance. It is a new type of green and completely degradable, bio-based, special-purpose fibre material for flame-retardant protective products, boasting a broad prospect of application.

Genertec Advanced Materials was founded in June 2020 with a registered capital of RMB10 billion and is wholly owned by the state-owned company China General Technology Group.





## Guangxi Anhongda to start 1st phase of 500,000 t/a mulberry branch-derived fibre project

Summary: On 16 Jan., Guangxi Anhongda published 1st phase details of its 500,000 t/a mulberry branch-derived functional fibre project in Hechi of Guangxi.

Hechi is the largest silkworm breeding and mulberry growing city in China, with an area of 620.93 km<sup>2</sup> of mulberry gardens and a cocoon production of 139,800 tonnes, with an integrated industrial chain of "mulberry—silkworm—cocoon—silk—silk fabric". Around 1.3 million tonnes of dried mulberry branches are produced annually in the area surrounding Hechi. However, mulberry branches, the most abundant and fibre-rich by-product of mulberry silk production, are not efficiently utilised.

**Guangxi Anhongda New Material Co., Ltd.** (Guangxi Anhongda, registered in Oct. 2023 with a capital of RMB180 million by China Chubb Investment Holding Co., Ltd.) proposed a 500,000 t/a mulberry branch-derived functional fibre project, to improve the utilisation rate of local mulberry branch waste and further develop the mulberry silk industrial chain in a three-phased construction:

- Phase I: 200,000 t/a bio-based functional fibre—50,000 t/a functional fibres from mulberry branch bark and 150,000 t/a fibre for moulding from mulberry stalk
- Phase II: 300,000 t/a bio-based functional fibre—70,000 t/a functional fibres from mulberry branch bark and 230,000 t/a fibre for moulding from mulberry stalk; and 100,000 t/a high-end moulded products
- Phase III: 50,000 t/a bio-based nanocellulose; 50,000 t/a functional air filter materials and filter materials for vehicles; 300,000 t/a high-end moulded products

**More on the phase I**, according to the environmental impact report (draft for public comments) publicised on 16 Jan:

- Construction nature: New construction
- Investment: USD90.06 million (RMB639.93 million), 3.09% (=USD2.79 million/RMB19.80 million) of which for environmental protection
- Location: Hechi City Industrial Park, Guangxi Zhuang Autonomous Region
- Site area: 188,262.68 m<sup>2</sup>
- Construction content: Production lines, along with mulberry branch stockyard, wastewater treatment station, storage warehouse and other auxiliary, public utilities, environmental protection facilities
- Consumption of mulberry branch: 236,200 t/a
- Designed capacity: 200,000 t/a bio-based functional fibre—50,000 t/a functional fibres from mulberry branch bark and 150,000 t/a fibres for moulding from mulberry stalk
- Construction duration: construction to start in June 2024 and facility to open up in June 2025
- Working system: 150 people working in four 8-hour shifts and three running systems, for 7,920 hours or 333 days per year



Price Update

**TABLE 5:** Average market prices of major raw materials of bio-based materials in China, Jan.–March 2024

No.	Product	Price, USD/t
1	Sugarcane	143.03
2	Corn	328.13
3	Wheat	392.41
4	Bagasse	43.96
5	Corn cob	52.83
6	Wheat straw	92.82
7	Corn stover	78.23

Source:CCM

**TABLE 6:** Average ex-works prices of major bio-based materials in China, Jan.–March 2024

No.	Product	Price, USD/t	Remark
1	PHA (Polyhydroxyalkanoates)	8,597	Films
2	PBS (Polybutylene succinate)	3,594	Extrusion grade and injection moulding
3	PPC (Propylene carbonate)	3,805	Injection moulding
4	PLA (Polylactic acid)	3,033	Injection moulding
5	PVA (Polyvinyl alcohol)	1,747	Flocculent
6	Starch-based material	2,983	Film moulding
7	PTT (Polytrimethylene terephthalate)	3,392	Fibre
8	PBAT (Polybutylene adipate terephthalate)	1,726	Film moulding

Source:CCM



## News in Brief

### Tongling Leaf plans 20,000 t/a FDCA production line

On 29 Dec., 2023, Tongling Leaf Biotech Co., Ltd. (Tongling Leaf) had the environmental impact assessment (EIA) of the project to build one production line for bio-based 2,5-furandicarboxylic acid (FDCA) and the downstream materials publicised for the first time. Tongling Leaf was founded in August 2023 with a registered capital of RMB10 million, and it is wholly-owned Hefei Leaf Biotech Co., Ltd.

#### Project details:

- Construction nature: New construction
- Total investment: USD56.29 million (RMB400 million)
- Location: Economic Development Zone of Tongling City, Anhui Province
- Site & floor areas: 53,333 m<sup>2</sup> & 35,000 m<sup>2</sup>
- Construction content: Purchase equipment for dehydration, oxidation, refinement, sewage treatment system, etc.
- Designed capacity: approx. 20,000 t/a FDCA (in continuous flow production)

### Shandong Xiaowei's 50,000 t/a bio-based L-malic acid / succinic acid project approved

On 20 Feb., Shandong Xiaowei Biotechnology Co., Ltd. (Shandong Xiaowei)'s 50,000 t/a bio-based L-malic acid / succinic acid (SA) project using bio-fermentation was approved by local bureau of ecology and environment. Shandong Xiaowei was founded in Dec. 2021 with a registered capital of RMB500 million.

#### Project details:

- Construction nature: New construction
- Location: Shouguang City (county-level), Weifang City, Shandong Province
- Investment: USD77.40 million (RMB55.00 million), 1.25% (=USD971,024/RMB6.90 million) of which for environmental protection
- Site area: 218,579 m<sup>2</sup>
- Construction plan: Build 4 production workshops, storehouse, public utilities, and purchase sets of production equipment
- Capacity: 20,000 t/a L-malic acid or 30,000 t/a SA (in a shared line)
- Main materials: Starch slurry (consumption: 169,525 t/a), corn steep liquor, amylase, etc.
- Working system: 200 employees in four shifts and three running systems, totalling 300 working days annually
- Commencement of operation (estimated): Feb. 2025

### Zhongke Baiyijin completes RMB10+ million Pre-A round

In early Jan., Zhongke Baiyijin (Zhengzhou) New Energy Technology LLC (Zhongke Baiyijin) completed the Series Pre-A round raising USD14+ million (RMB10+ million) exclusively from Chinese Academy of Sciences Venture Capital Management. The proceeds will be used in scaling production of 1,3-propanediol (1,3-PDO), technical iteration and marketing of bio-based ethylene glycol (EG). And the planned upgrade of 1,3-PDO production aims to help boost Chinese technological independence in the field.

Founded in May 2019, Zhongke Baiyijin is committed to dibasic alcohol-related technological R&D and production, and its main portfolio encompasses bio-based EG, 1,3-PDO, 1,2-propylene glycol, etc. Its core technologies and technical teams are developed and constituted by Professor Zhang Tao and his team with Dalian Institute of Chemical Physics, Chinese Academy of Sciences.







In Oct. 2023, Zhongke Baiyijin's "1,000-tonne pilot-scale bio-based EG facility" announced a successful startup, marking China's first industrial application of biomass-catalysed, highly selective system for EG production and a strong technical foundation for a larger industrial operation at the 10,000-tonne-level. According to the production data, the overall product selectivity reaches 80% for the process, well higher than the designed level; the product purity points to 99.9% with ultraviolet/UV transmittance measuring up to polyester level. The related products are now available for sale at a green premium compared to petroleum-based EG, and highly recognised by the market.

### **Zhuhai MedPHA raises RMB10 million+ in Series A+ round**

On 2 Feb., Zhuhai MedPHA Biotechnology Co., Ltd. (Zhuhai MedPHA) announced closure of a series A+ round raising USD1.4+ million (RMB10+ million), led by Huafa Group's investment platform with participation from Taiping Innovation and Motianshi Investment. The proceeds will be used in projects for developing polyhydroxyalkanoates (PHA) product pipeline, production expansion, marketing and team development.

Founded in 2019, Zhuhai MedPHA mass produces novel biomaterials (PHA and the derivatives) by using the next-generation industrial biotechnology developed by Professor Chen Guoqiang and his team of Tsinghua University, with focus on the latest generation of poly(3-hydroxybutyrate-co-4-hydroxybutyrate)/P34HB. Currently the company has one production line in operation producing 1,000 t/a PHA via open and continuous fermentation, by using self-developed strain technology, new material application platform, and world-class synthetic biotechnology.

Since its establishment, Zhuhai MedPHA has gathered over USD1.4+ million (RMB10 million+) of subsidies from government industrial and scientific research funds, completed one USD2.8 million (RMB20 million) Angel round in early 2021 and one USD9.8+ million (RMB70+ million) Series A round in May 2022.

### **Xinxiang Chemical to add 30,000 t/a biomass-derived cellulose fibre capacity in Xinjiang**

On 28 Feb., Xinxiang Chemical Fiber Co., Ltd. (Xinxiang Chemical, Stock code: 000949.SZ) proposed to kick start the first phase of the "30,000 t/a biomass-derived cellulose fibre project" to fit into the company's plan for expansion and production layout optimisation. The project is to settle in Dashan Mount Industrial Park, Economic and Technological Development Zone of Tumushuke, Xinjiang Uygur Autonomous Region, undertaken by its subsidiary Xinjiang Tianlu New Material Technology Co., Ltd. The 1st phase accounts for budget of USD55.59 million (RMB395 million) in building 10,000 t/a capacity for biomass-derived filament yarn in 12 months, set to break ground in Q1 2024. The annual sales income from the 1st phase is expected to reach USD46.94 million (RMB333.56 million) in full operation, and profit from sales to be USD10.98 million (RMB78 million).

Regarding to projects in progress, Xinxiang Chemical has one 10,000 t/a biomass-derived cellulose fibre line (1st phase of the 20,000 t/a project) and 10,000 t/a biomass-derived cellulose fibre project under construction, respectively in Xinxiang of Henan and Tumushuke of Xinjiang (same location as the above-mentioned).





## Zhongke Qichen to found 100,000 t/a bamboo fibre factory

On 20 March, Zhongke Qichen New Material (Zhejiang) Co., Ltd. (Zhongke Qichen) obtained approval from the Ecology and Environment Bureau of Wenzhou City for its 100,000 t/a bamboo fibre construction project. Established on 23 May, 2022 with a registered capital of RMB100 million, Zhongke Qichen plans to utilise local bamboo resources to produce high-quality fibres through processes like bio-enzyme softening, and removal of the outer skin of bamboo culms, flattening, and compression. These fibres will supply to textile factories as raw materials. The bamboo powder and residue will be processed into formaldehyde-free flame-retardant boards through mechanical cold-pressing technology, to support for recycling of wastes.

### Project details:

- Construction nature: New construction
- Total investment: USD73.27 million (RMB520.66 million), 0.72% (=USD0.52 million/RMB3.73 million) of which for environmental protection
- Location: Oujiangkou Industry Cluster, Wenzhou City, Zhejiang Province
- Leased land area: 65,233.44 m<sup>2</sup>
- Construction content: Build workshops, comprehensive research and development buildings; and purchase production equipment like twin-screw fibre separators, hydropress, and boiling tank
- Designed capacity:
  - 100,000 t/a Bamboo fibre
  - 40,000 t/a Bamboo extract (nutrient solution)
  - 50,000 m<sup>3</sup> Cold-pressed formaldehyde-free flame-retardant board
- Raw material consumption: 250,000 t/a Fresh bamboo wood, 2,500 t/a auxiliary agent (bio-enzyme), 16,000 t/a inorganic adhesive
- Working system: 220 employees working in three 8-hour shift for 300 days per year
- Construction period: 1 year

## Huangpu Institute to build 1,000 t/a bio-based polyester elastomer pilot project

On 18 March, the environmental impact assessment of the 1,000 t/a bio-based polyester elastomer (BPE) pilot project proposed by Huangpu Institute of Green Advanced Materials started its second publication for comments. The Institute was established in May 2023, jointly by the Management Committee of Guangzhou High-tech Industrial Development Zone and South China University of Technology.

### Project details:

- Construction nature: New construction
- Investment: USD11.19 million (RMB79.50 million), 1.82% (=USD0.20 million/RMB1.45 million) of which for environmental protection
- Location: Huangpu District, Guangzhou City, Guangdong Province
- Site & floor areas: 658.5 m<sup>2</sup> & 2,634 m<sup>2</sup>
- Construction content: one polyester workshop, including main and auxiliary facilities, and public utility and environmental protection unit
- Target product: three types of BPE, namely BPE1, BPE2, BPE3
- Staffing: 40 workers
- Pilot-scale working system: 3 x 8-hour shifts for up to 330 days or 8,000 hours per year
- Construction duration: 10 months





The product (BPE) of this project is the first-ever developed type of synthetic elastomer by Academician Zhang Liqun and his team. In terms of application development, the team has enabled uses of degradable bio-polyester elastomers in various fields such as low-temperature-resistant adhesives, toughening polylactic acids, polyvinyl chloride plasticisers, degradable tyres, shoes and chewing gum. In industrialisation, the team has successfully scaled up production from lab-scale experiment to the 1,000 tonne level in 2021. This project will set a solid foundation for the subsequent construction of over 10,000 t/a capacity.



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**Publisher : Kcomber Inc.**

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