

Bio-based Material Quarterly Newsletter

Q3 2022

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Bio-based Materials Quarterly Newsletter



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Headline

In Sept., China's MIIT and the other departments jointly issued an implementation plan for the high-quality development of the raw materials industry, with the development of bio-based materials listed as one of the primary tasks.

Jindan Technology reported operating revenue and net profit for H1 with huge year-on-year increases and moving forward with a new PLA project, the designed capacity of which has been scaled up from 10,000 t/a to 75,000 t/a; while Kingfa's net profit tumbled, deferring its plan for putting the 30,000 t/a PLA project into operation.

Zhongke Biotech and Cathay Biotech both delivered remarkable financial performance for H1 2022. The two companies have been actively setting up production capacities of long-chain dibasic acids (LCDAs) and bio-based polyamides (PAs).

On 16 Aug., Hisun Biomaterials made IPO on the Shanghai's STAR Market, boasting fast-growing revenue and sustainable capacity improvement of PLA over the past three years.

COFCO Biotech reported a 12.21% year-on-year increase in its net profit for H1 2022, with ongoing initiatives to propel biodegradable materials PHA, PLA, and lactide projects.

In this Q3, China sees new developments in PLA industry, including projects in Jiangxi Keyuan and Langjing New Material, and the proposal for 300,000 t/a PLA construction raised by Zhongke Baichuang Environmental Biotechnology (Guantao) Co., Ltd.

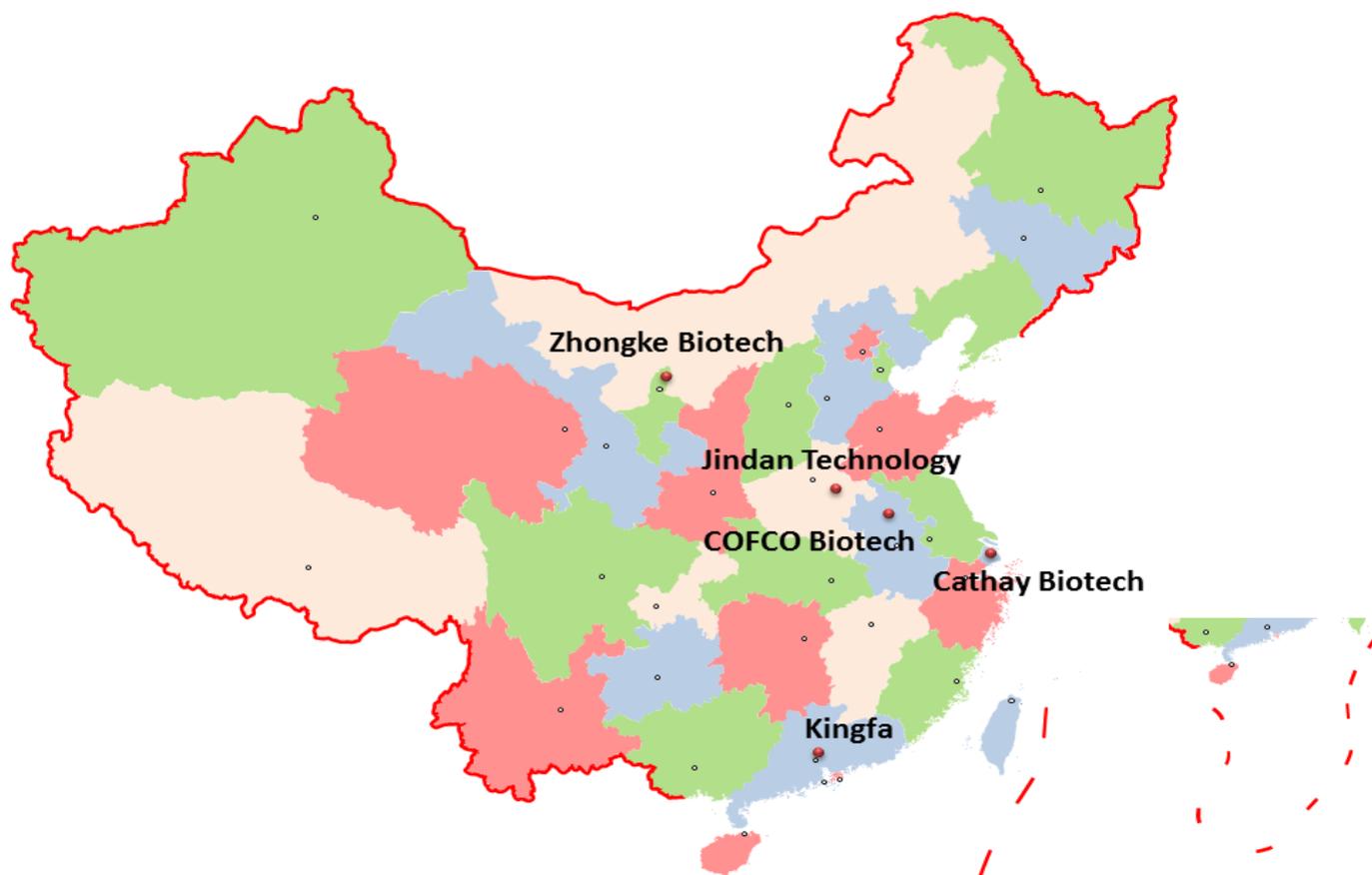
In Aug.–Sept., two new bio-based fibre projects were publicised and one bio-based fibre composite project was resubmitted for approval to proceed.

On 6 Sept., BBKA Biochemical published an EIA report (exposure draft) of its 5,000 t/a D-lactic acid industrialisation demonstration project and the 3,000 t/a PLA industrialisation demonstration project.

On 31 Aug., the EI report of Zhangjiagang Jiutai's 30,000 t/a PTT new bio-based material project was approved.

In Aug., the EI reports for the bio-based new material (bamboo-based cellulose) constructions of Jinzhu New Material and Anhui Huizhu were posted for public review, the 1st phase of each accounts for capacity of 100,000 t/a.







Editor's Note

Welcome to the Bio-based Material Quarterly Newsletter Q3 2022.

Policy

China's MIIT and other departments jointly issued an implementation plan for the high-quality development for raw materials industry, highlighting bio-based materials in Sept.

Market dynamics & company performance

In H1 2022, Kingfa reported tumbling net profit, in comparison with many other players like Jindan Technology, Zhongke Biotech, Cathay Biotech, COFCO Biotech which have performed well and continued to make progress in their biodegradable material projects. Hisun Biomaterials went public on Shanghai's STAR Market in Aug.

Multiply PLA-related projects are brought up in China, including BBKA Biochemical's 5,000 t/a D-lactic acid and 3,000 t/a PLA industrialisation projects, Zhongke Baichuang Environmental Biotechnology (Guantao) Co., Ltd.'s 300,000 t/a PLA project, Huakang Pharma's 2 million t/a corn processing project (including products of LA and PLA), along with some seeing further development, i.e. Jiangxi Keyuan's and Langjing New Material's PLA projects.

There are updates on other bio-based material projects, including the bio-based new material projects in Zhangjiagang Jiutai, Jinzhu New Material and Anhui Huizhu, the fibre composite new material project in Yibin Grace Hygienic Materials Technology Co., Ltd., the starch-based biodegradable material project in Zhongshan Co-polymer. Two new bio-based fibre projects were firstly unveiled by Youxian Technology (Dandong) Co., Ltd. and Anhui HengRun Chemical Fiber Co., Ltd.; Weigou Workshop plans to build China's biggest 30,000 t/a PHA production base; Huaheng Biotech pushes SA and PDO industrialisation; CellUranics raised tens of millions RMB in angel financing; GS Biotech kicked off construction of bio-based degradable materials (HMF, FDCA, and more) base project; Puyang Baiaomaisi announced completion of its 50 t/a FDCA pilot-scale equipment installation.

Price

In the third quarter of 2022, PLA prices rose slightly but sustaining at an overall low level. PHA prices were levelling off.

The USD/CNY exchange rate in this newsletter is USD1.00=CNY6.8821 on 1 Sept., 2022, sourced from the People's Bank of China. Unless otherwise specified, all the prices mentioned in this newsletter will include the VAT.





Governmental Direction

China releases implementation plan for high-quality raw material industry development

Summary: In Sept., China's MIIT and the other departments jointly issued an implementation plan for the high-quality development of the raw materials industry, with the development of bio-based materials listed as one of the primary tasks.

On 14 Sept., China's Ministry of Industry and Information Technology (MIIT), the State-owned Assets Supervision and Administration Commission of the State Council (SASAC), the State Administration for Market Regulation (SAMR), and the China National Intellectual Property Administration (CNIPA) jointly published an *Implementation Plan for the High-quality Development of the Raw Materials Industry (Implementation Plan)*, which highlights the development of bio-based materials and green & low-carbon products.

Background of the Implementation Plan

Although China's raw material industry currently meets the needs of domestic consumption and national economic development, there are still many deficiencies in this sector, including a shaky foundation for quality development, many average products or little-known excellent products, weak brand awareness, and lower product stability and consistency than the requirements for high-quality development. The Implementation Plan aims to help the raw materials industry increase variety, raise quality, and create brands; support the transformation of quality, efficiency, and power; and lift both quality and efficiency at the same time.

The primary tasks related to degradable plastics and bio-based materials are indicated as follows:

- Diversify the variety of new materials
 - Focus on the development of key basic materials such as bio-based and biomedical materials, high-temperature alloys, high-performance special alloys, and rare earth functional materials;
 - Strengthen the R&D and industrialisation of important basic materials, perfect the production and application platform for new materials, optimise the upstream and downstream cooperation mechanism, and highlight high-performance, functionalised, and distinctive new material products
- Develop green and low-carbon products
 - Enhance the R&D and application of degradable plastics, bio-based materials and other superior green and low-carbon materials, vigorously develop Carbon Capture and Storage (CCS) technologies such as oxy-fuel combustion, membrane separation, and direct air capture, and expand the supply of low-carbon and zero-carbon products;
 - Promote the implementation of green product evaluation standards, establish a database for whole life-cycle carbon emissions of key products, and investigate the possibility of including carbon footprint indicators for raw material products in the evaluation system;
 - Publish a portfolio of green and low-carbon technologies and products, and quicken the R&D and application of recyclable, low-carbon & environmentally-friendly products, and other green products;
 - Accelerate the creation of a uniform standard, certification and labelling system for green products, and guide leading enterprises with ecological dominance to build green product supply chain systems to create and drive green consumption
- Boost the quality of basic material products
 - Progress R&D of design and manufacturing technologies and quality control technique breakthroughs for bio-based & biomedical materials, high-performance chemical materials, carbon fibres and their composites, and advanced inorganic non-metallic materials, etc.;
 - Apply quality engineering technologies to shorten the R&D, engineering and industrialisation cycles





- Improve the standard system of key products
 - Develop new process standards for natural fibre materials, recycled chemical fibre materials, carbon-based materials, silicon-based materials and other key basic materials, and perfect the standard system covering the whole life cycle of material R&D, production, application and service, the whole industrial chain, and consumer concerns





Market Analysis

Jindan Technology and Kingfa release performance reports for H1

Summary: Jindan Technology reported operating revenue and net profit for H1 with huge year-on-year increases and moving forward with a new PLA project, the designed capacity of which has been scaled up from 10,000 t/a to 75,000 t/a; while Kingfa's net profit tumbled, deferring its plan for putting the 30,000 t/a PLA project into operation.

On 16 Aug., Henan Jindan Lactic Acid Technology Co., Ltd. (Jindan Technology) and Kingfa Sci. & Tech. Co., Ltd. (Kingfa) released their respective performance reports for H1 2022. These two companies also disclosed the progress of their biodegradable material projects.

In H1 2022, Chinese businesses were faced with multiply test amidst the complex and volatile environment. On one hand, the demand from overseas market declined, which could be attributed to the on-going Russia-Ukraine war and the energy crisis confronting the United States and European countries. On the other hand, slack domestic market consumption, unstable raw and auxiliary material price movements that were hard to predict, new entrants, inadequate implementation of China's ban on single-use as well as non-degradable plastic products, and the impacts of COVID-19 pandemic in places, are all taking tolls on them. Contending with those adverse factors, Jindan Technology managed to lift its operational efficiency plus achieve year-on-year increases in its operating revenue and net profit, by adjusting sales structure of its products, continuing to carry out technological R&D, and accelerating its move to promote informatisation.

Jindan Technology's key financial indicators for H1:

- Operating revenue: USD117.22 million (RMB806.72 million), up 22.52% YoY
- Revenue of lactic acid (LA, the main product): USD73.72 million (RMB507.32 million), up 28.44% YoY
- Net profit attributable to equity holders: USD12.81 million (RMB88.14 million), up 25.34% YoY
- Net profit attributable to equity holders after deduction of non-recurring loss/profit: USD12.82 million (RMB88.25 million), up 42.23% YoY

In terms of building the complete industrial chain, the company has made progresses in the following projects, all located in Zhoukou City:

- 150,000 t/a polylactic acid (PLA) biodegradable new material project: The phase I (75,000 t/a) along with the 200,000 t/a polymer-grade LA and ancillary facilities project broke ground on 7 Sept. The designed capacity for this phase's construction was adjusted from the originally planned 10,000 t/a to 75,000 t/a in Aug., 2022.
- 10,000 t/a lactide project: The de-bottlenecking of key technologies has been completed and the project is now equipped with large-scale production facilities which have been incorporated into fixed assets in Jan., 2022. However, the operation has been in suspension, because of the COVID-19 pandemic. According to the company, it will be activated in the future based on the market status.
- 60,000 t/a biodegradable polyester and its products project entered equipment installing phase.

Additionally, Henan Poly Lactic Acid Biodegradable Material Industry Research Institute Co., Ltd., Jindan Technology's wholly-owned subsidiary, was established for building a first-class R&D platform and attracting talents for research on the culture of lactic acid bacteria (LAB), LA biotechnologies, and series products of new biodegradable material.





The Biodegradable Material Industry Cluster in Zhoukou City is currently in healthy development, and will march towards the goal of becoming the world-class biodegradable material industry cluster with the production output of over USD14.53 billion (RMB100 billion). This Cluster, one of the first batch of strategic emerging industries clusters in Henan Province, highlights the main industry chain of the biodegradable material industry starting from corn to starch, LA, lactide, PLA, modified materials, and the relevant products, with Jindan Technology as the leading enterprise.

For the same period of time, Kingfa made depressed financials as follows:

- Operating revenue: USD2.83 billion (RMB19.47 billion), up 0.93% YoY
- Net profit attributable to equity holders: USD116.53 million (RMB802 million), down 49.26% YoY
- Net profit attributable to equity holders after deduction of non-recurring loss/profit: USD102 million (RMB702 million), down 51.97% YoY

Kingfa runs business in segments of modified plastic, new material, green petrochemical and healthcare, with products categorised into 7 types, namely modified plastics, environmentally-friendly and high-performance recycled plastics, fully-biodegradable plastics, special engineering plastics, carbon fibre and composite materials, light hydrocarbon and hydrogen energy, and polymer products for healthcare application. As things are at the moment, the Kingfa will put its key focus on new materials for a long time to come.

Results and progresses made in the new material segment for H1:

- Sales volume of the finished products totalled 624,00 tonnes, up 13.83% YoY, 49,400 tonnes of which were fully biodegradable plastics, up 12.09% YoY.
- The company's subsidiary, Liaoning Kingfa Biomaterial Co., Ltd., is actively organising the R&D for bio-based monomers and bio-based materials; its 10,000 t/a bio-based 1,4-butanediol (BDO) project is being advanced swimmingly.
- The activation of the company's constructed 30,000 t/a PLA capacity has been postponed until Q4 2022.

In addition, in July, 2022, the Four-party Strategic Cooperation Agreement was signed by Kingfa, Hebi Investment Group Co., Ltd., Hebi Coal Chemical Co., Ltd., and Hebi Baoshan Economic and Technological Development Zone of Hebi City, Henan Province, for the development of production base for biodegradable materials and comprehensive laboratory for polyformaldehyde (POM) modified materials and biodegradable materials, incorporating integrated industrial ecology with competitive R&D, industrialisation, and product marketing of new functional materials.

Zhongke Biotech & Cathay Biotech: Developments in LCDA and PA projects

Summary: Zhongke Biotech and Cathay Biotech both delivered remarkable financial performance for H1 2022. The two companies have been actively setting up production capacities of long-chain dibasic acids (LCDAs) and bio-based polyamides (PAs).

In Aug., Ningxia Zhongke Biotechnology Co., Ltd. (Zhongke Biotech, Stock Code: 600165, changed from Ningxia Xinri Hengli Steel Wire Rope Co., Ltd. or NSWRC since July 2022) and Cathay Biotech Inc. (Cathay Biotech) released their respective performance reports for H1 2022. The two companies have been actively setting up production capacities related to bio-based materials, mainly long-chain dibasic acids (LCDAs) and bio-based polyamides (PAs).



**Ningxia Zhongke Biotechnology Co., Ltd. (Zhongke Biotech)**

On 10 Aug., Zhongke Biotech released the semi-annual report for H1 2022, which shows that the company mainly engaged in the production and sale of LCDAs and coal-based activated carbon during the reporting period, with H1 performance figures as follows:

- Operating revenue: USD69.06 million (RMB475.30 million), up 462.75% YoY
 - The company attributes this growth to the launch of LCDAs, which have been produced and marketed by its subsidiary, Ningxia Zhongke Biochemical Material Co., Ltd. (Zhongke Biochemical, formerly named Ningxia Hengli Biochemical Co., Ltd.) since later last year.
- LCDA segment:
 - Sales: USD51.57 million (RMB354.93 million)
 - Net profit attributable to equity holders: USD3.24 million (RMB22.28 million)
 - These two key indicators accounted for more than 50% of the company's operating revenue and net profit respectively, which made LCDAs one of the company's major business, in addition to the loss-making coal-based activated carbon in H1.
- Net profit attributable to equity holders: USD1.29 million (RMB8.91 million)

On 16 Aug., Zhongke Biotech released another announcement stating that in order to meet the company's development needs and fully utilise the technological transformation results of its subsidiary's production technologies of LCDAs, it plans to invest USD327.41 million (RMB2.25 billion) in building the "integration project of 50,000 t/a LCDAs and 50,000 t/a bio-based new materials" in 24 months, which will also be undertaken by its subsidiary—Zhongke Biochemical. By undertaking this project, Zhongke Biochemical will focus on the technological development and production expansion of LCDAs (produced by microbiological method) and high temperature resistant long-chain PAs.

Previously, Zhongke Biotech completed its LCDA project (50,000 t/a for dodecanedioic acid (DDDA)), with developments in this project illustrated as follows:

- In Jan., 2021, the project entered trial production phase.
- In Sept., 2021, the quality of the products produced during trial production met the technical criteria of polymer-grade standard.
- In Oct., 2021, the project formally went into operation.

Zhongke Biotech revealed that it will carry out in-depth cooperation with Institute of Microbiology of Chinese Academy of Sciences in the technological innovation of LCDAs and R&D of downstream products, to incubate new growth forces and continuously strengthen its core competitiveness.

Cathay Biotech Inc. (Cathay Biotech)

As a leading enterprise in China's synthetic biology industry, Cathay Biotech achieved strong performance results for H1 2022 and has been setting up new production lines for LCDAs, bio-based PA, and bio-based pentamethylene diamine (PDA) recently.

Excerpted from its semi-annual report released on 12 Aug., performance figures of Cathay Biotech for H1 2022:

- Operating revenue: USD187.28 million (RMB1.29 billion), up 13.53% YoY
- Net profit attributable to equity holders: USD48.89 million (RMB336.45 million), up 7.71% YoY
- Net profit attributable to equity holders after deduction of non-recurring loss/profit: USD48.76million (RMB335.58 million), up 14.83% YoY





Cathay Biotech's revenue for H1 mainly came from the sales of LCDAs (75,000 t/a of production capacity via biological method). As the large-scale production lines for bio-based PA (100,000 t/a) and bio-based PDA (50,000 t/a) have been put into operation since mid-2021, the company also made profits from these two products in H1.

In H1 2022, Cathay Biotech was actively expanding its production capacity and setting up industrial chain of bio-based materials:

- Cathay (Wusu) Biotechnology Co., Ltd., a controlled subsidiary of Cathay Biotech, put its production lines into operation in mid-2021, which involve 50,000 t/a of capacity for bio-based PDA and 100,000 t/a of capacity for bio-based PAs. In spite of the fact that the sales and promotion of bio-based PAs in H1 2022 were adversely affected by the COVID-19 pandemic, a series of applications of bio-based PAs and composite materials in many fields are still being researched and developed by the company.
- Due to the COVID-19 pandemic, the construction progress of the project located in Shanxi Synthetic Biology Industrial Ecological Park is behind the schedule. The 40,000 t/a sebacic acid (produced by biological method) project is scheduled to be put into trial production in Q3 2022. The 500,000 t/a bio-based PDA and 900,000 t/a bio-based PA project is under construction.
- Aiming to lay a foundation for downstream application and business expansion, Cathay Biotech will continue to undertake R&D projects for LCDAs, high temperature resistant PAs, PA elastomers, agricultural residues, and biodegradable materials.

Cathay Biotech said that with main products in hand, the company boasts prominent competitive edge over its competitors in the industry. However, there is still a huge market space for biological manufacturing players to fill, which could lead to market competition. Addressing potential market competition, the company will keep on deeply exploiting internal potentials and seeking opportunities for industry integration, in an attempt to enhance the competitive edge, plus solidify and improve market shares.

Hisun Biomaterials makes debut on Shanghai's STAR Market

Summary: On 16 Aug., Hisun Biomaterials made IPO on the Shanghai's STAR Market, boasting fast-growing revenue and sustainable capacity improvement of PLA over the past three years.

On 16 Aug., Zhejiang Hisun Biomaterials Co., Ltd. (Hisun Biomaterials) made its initial public offering on the science and technology innovation board of the Shanghai Stock Exchange (SSE STAR Market). The company has nearly 20 years of experience in technical development of polylactic acid (PLA) and has succeeded in breaking down key technical barriers to industrialise PLA in its plants. Disclosed financial report of Hisun Biomaterial shows that, its PLA products accounted for 34% of domestic market share and 81% of China's exports of the same kind in 2021.

Key corporate financial results of Hisun Biomaterials in 2019–H1 2022 are as follows:

- Full 2021: Revenue jumped 122.72% YoY to USD90.54 million (RMB585.01 million) with revenue CAGR (2019–2021) of 58.83% and net profit CAGR (2019–2021) of 87.26%
- 2019–2021: Pure PLA and modified PLA compound represented the majority of the company's revenue, which collectively accounted to 97.98%, 97.92% and 99.25% respectively over the past three years.
- H1 2022: Revenue rose 13.96% YoY to USD43.97 million or RMB302.62 million, largely boosted by the ramp-up of PLA capacity, as new production lines operated by subsidiary Zhejiang Honor Biomaterials Co., Ltd. were put into operation, and sales increase amidst an overall uptrend in the market—as of 2021, Hisun Biomaterials has constructed PLA capacity of 45,000 t/a (5,000 t/a production with lactide as input), but was then producing 34,500 t/a of PLA before reaching the full capacity.





TABLE 1: Sales of main products of Hisun Biomaterials, 2019–2021

Year	Product	Capacity, t/a	Production, tonne	Capacity utilisation	Self use, tonne	Sales, tonne	Sales-output ratio
2021	Pure PLA	34,500.00	24,343.17	70.56%	7,807.46	13,886.58	89.12%
	Modified PLA compound	19,500.00	11,785.47	60.44%	146.96	11,560.30	99.34%
2020	Pure PLA	15,500.00	10,171.70	65.62%	4,472.79	4,599.10	89.19%
	Modified PLA compound	19,500.00	6,802.26	34.88%	348.08	6,599.55	102.14%
2019	Pure PLA	15,000.00	10,286.08	68.57%	5,784.15	4,702.36	101.95%
	Modified PLA compound	14,500.00	8,177.46	56.40%	108.94	8,169.08	101.23%

Source: Hisun Biomaterials

At present, Hisun Biomaterials has acquired the know-how for integrated PLA production from material synthesis to market application, and has realised scale production and sales of PLA with outlook for further expansion.

Efforts to expand production capacity over past years:

- 2004: Hisun Biomaterials initiated small-scale production line of 30 t/a PLA.
- 2008: A 5,000 t/a PLA production line with integrated processes of "lactic acid (LA)–lactide–PLA" was built up, but was running at a low utilisation rate due to immature techniques in producing lactide from LA.
- 2015–2020: The 10,000 t/a production and processing lines of PLA and the related products (with lactide as input) were constructed by the end of 2015; these lines were forced to undertake transformation of the original 5,000 t/a capacity to the facility processing lactide from LA in the face of supply shortage of Total Corbion PLA (TCP)'s lactide in 2019; since the start of 2020, the adjusted full capacity has been reached in general.
- Most recent: The 50,000 t/a PLA resin & products project of Zhejiang Honor Biomaterials Co., Ltd., has completed the phase I construction (30,000 t/a) which has been operational since Dec. 2020 and was upgraded technically in 2021, and has the phase II (20,000 t/a) construction running at a pilot scale currently. This project adopts the "Two Steps" method—microwave heating and conventional heating in the ring-opening polymerization (ROP) of lactide—with LA as input, and aims to found pure PLA capacity of 65,000 t/a as a whole.

On top of that, Hisun Biomaterials proposed the plan for a new plant aggregating designed PLA capacity of 150,000 t/a, which would be constructed and set out for pilot-scale production by June 2024, undertaken by its subsidiary Zhejiang Haichuangda Biomaterials Co., Ltd., in addition to a new 350,000 t/a PLA production line project in its long-term strategic plan. That means by 2026, a minimum of 500,000 t/a PLA capacity will be added on its currently operating and constructing lines.





COFCO Biotech progresses biodegradable materials projects

Summary: COFCO Biotech reported a 12.21% year-on-year increase in its net profit for H1 2022, with ongoing initiatives to propel biodegradable materials PHA, PLA, and lactide projects.

On 23 Aug., COFCO Biotechnology Co., Ltd. (COFCO Biotech) released its financial report for H1 2022 and detailed the status of its biodegradable materials projects in the following investor activity investigation. To expedite the construction of its lactide project, COFCO Biotech introduced strategic investments from state-owned holding businesses in Sept.

COFCO Biotech's operating data for H1 2022:

- Revenue: USD1.54 billion (RMB10.61 billion), down 11.78% YoY
 - Main causes in the revenue decrease: the equity transfer of Anhui COFCO Oil Company Limited, the decline in the sales volumes and prices of starch products, etc.
- Net profit attributable to shareholders of the listed company: USD114.16 million (RMB785.69 million), up 12.21% YoY
 - Main cause in the net profit increase: lower year-on-year expenses due to the company's continued management improvement

TABLE 2: Revenue split of COFCO Biotech by main product, H1 2022 vs. H1 2021

Product category	H1 2022		H1 2021		Trend
	Revenue, million USD	Proportion	Revenue, million USD	Proportion	
Fuel ethanol and by-products	733.02	47.55%	906.34	51.87%	-19.12%
Starch and by-products	276.38	17.93%	329.36	18.85%	16.09%
Sugars	222.13	14.41%	223.39	12.78%	-0.56%
Monosodium glutamate (MSG) and by-products	95.09	6.17%	90.12	5.16%	5.51%
Citric acid, citrates and by-products	153.38	9.95%	53.98	3.09%	184.12%
Oils	0	0.00%	76.43	4.37%	-100.00%
Others	45.91	2.98%	40.66	2.33%	12.91%

Source: COFCO Biotech

During the reporting period, COFCO Biotech maintained its "bulk + specialty" model integrating food raw materials & ingredients, bioenergy, and biomaterials while continuing to optimise its product mix and promote business transformation and upgrading. Its primary biomaterial products are made of lactide, PLA, PHA, and other renewable green biomaterials. With the to-be-operational production of lactide and the industrialisation of PHA products, the enterprise will eventually create a full industrial basis of biodegradable materials.





At present, COFCO Biotech is moving forward with its biodegradable materials projects in an orderly manner as planned.

- PHA: With the main technical indicators meeting the design standards, the PHA project was successfully and quickly put into operation in June. To increase product quality and performance, technology will be further optimised; and to maximise its effect, PHA application performance will also be examined and adjusted.
- PLA: PLA production was consistent in H1 2022. Since the import of lactide (PLA's raw material) is becoming more challenging, the group currently procures the ingredients mostly from domestic producers, which affects the operating rate of its PLA products. In terms of R&D innovation, the enterprise developed a novel PHA and PLA blending system that has considerably enhanced the heat resistance of blended fibres.
- Lactide: COFCO Biotech introduced strategic investments from state-owned holding companies in mid-Sept. A consortium constituted by Aerospace Capital Holdings Co., Ltd. and Shaanxi Guohua Convergent Industry Development Fund Partnership (L.P.) has acquired 49% of COFCO Biomaterials (Yushu) Co., Ltd. to support its 30,000 t/a lactide project and to develop the localisation of foreign equipment and the product application in the high-end sector, laying a solid foundation for future growth. This project broke ground on 23 Sept.





Company Dynamics

Advance of China's PLA projects

Summary: In this Q3, China sees new developments in PLA industry, including projects in Jiangxi Keyuan and Langjing New Material, and the proposal for 300,000 t/a PLA construction raised by Zhongke Baichuang Environmental Biotechnology (Guantao) Co., Ltd.

In this Q3, there are updates in Jiangxi Keyuan Bio-Material Co., Ltd.'s 130,000 t/a polylactic acid (PLA) project, Shandong Langjing New Material Technology Co., Ltd.'s 1,000 t/a PLA pilot line construction, and Zhongke Baichuang Environmental Biotechnology (Guantao) Co., Ltd. put forward a 300,000 t/a PLA project.

Jiangxi Keyuan Bio-Material Co., Ltd. (Jiangxi Keyuan)

On 14 July, the environmental impact assessment (EIA) document of the 200,000 lactic acid (LA) and 130,000 t/a polylactic acid (PLA) project of Jiangxi Keyuan was given approval by the local authority. Following on 23 July, its parent Levima Advanced Materials Co., Ltd. (Levima) launched financial plan to push this project with estimated maximum investment of USD261.55 million (RMB1.8 billion), which is comprised of USD43.59 million (RMB300 million) from own funds and USD217.96 million (RMB1.5 billion) as financial guarantees.

Project Overview:

- Construction nature: New construction
- Location: Chemical Fibre Industrial Base of Lianxi District, Jiujiang City, Jiangxi Province
- Total investment (including Levima's funds): USD433.34 million (RMB2.98 billion), 3.50% (=USD2.2 million or RMB15.15 million) of which are for environmental protection
- Construction period:
 - Phase I: July 2022–Dec. 2023
 - Phase II: Feb. 2024–Dec. 2025
- 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 to built in the phase I into 20,000 t/a low-gloss pure PLA.

Jiangxi Keyuan was set up in Jan. 2008 and has dedicated to R&D, production and sale of the biodegradable material PLA with establishment of over 1,000 t/a PLA integration pilot line which has finished commissioning.

Shandong Langjing New Material Technology Co., Ltd. (Langjing New Material)

On 29 July, the second-time post of Langjing New Material's project to construct a 1,200 t/a lactide and 1,000 t/a PLA pilot line was made with EIA on the company's homepage.

Project Overview:

- Construction nature: New construction
- Location: Zibo Science and Technology Industry Park, Fangzhen Town, Zhangdian District, Zibo City, Shandong Province





- Designed capacity: 1,200 t/a lactide and 1,000 t/a PLA
- Construction content:
 - a 1,200 t/a lactide and 1,000 t/a PLA product for medical use pilot production line;
 - 3 functional areas for production activities, scientific research exhibition, and for R&D testing and other supporting facilities
- Prior to this post, the company had closed the first-phase construction of 100 t/a "lactic acid—lactide—PLA" pilot production line and put it into production at the start of 2021.

Langjing New Material was founded in Nov. 2020 and is wholly-owned by Beijing Langjing Huiming Biotechnology Co., Ltd. According to the company, additional setup of 30,000 t/a capacity is coming up in two years.

Zhongke Baichuang Environmental Biotechnology (Guantao) Co., Ltd.

On 16 Sept., the company brought forward project plan for constructing 300,000 t/a bio-based new material PLA fibre.

Project Overview:

- Construction nature: New construction
- Project investor: China International Financial Investment Group Co., Ltd.
- Investment: USD799.17 million (RMB5.5 billion)
- Site area: 33.33 ha (500 mu)
- Construction contents and floor areas: plant buildings (23.88 ha), warehouses (3.12 ha), office buildings (1.2 ha), other affiliated facilities (2.5 ha)
- Designed capacity: 300,000 t/a bio-based new material PLA fibre

Zhongke Baichuang Environmental Biotechnology (Guantao) Co., Ltd. was incorporated on 31 Aug., 2022, 85% of the equity of which are owned by the subsidiary of China International Financial Investment Group Co., Ltd. (CICC, Stock Code: 601995.SH, 3908.HK). CICC is China's first sino-foreign investment bank pioneering trades across fields and borders.

New bio-based fibre / fibre composite projects in China

Summary: In Aug.–Sept., two new bio-based fibre projects were publicised and one bio-based fibre composite project was resubmitted for approval to proceed.

In Aug.–Sept., two new bio-based fibre projects were publicised, proposed by Youxian Technology (Dandong) Co., Ltd. and Anhui HengRun Chemical Fiber Co., Ltd; one bio-based fibre composite project (phase I) was resubmitted by Yibin Grace Hygienic Materials Technology Co., Ltd. for approval to proceed.

Youxian Technology (Dandong) Co., Ltd. disclosed the 50,000 t/a bio-based nylon 56 / nylon 66 chip and fibre construction project with the environmental impact assessment (EIA) on its homepage for the first time on 5 Aug.

Project details:

- Construction nature: New construction
- Location: Hi-Tech Industrial Development Zone of Dandong City, Liaoning Province
- Site & floor areas: 155,326 m² (the existing site areas) & 116,547 m² (new floor areas)





- Construction content: polymerisation workshop, filament yarn workshop, high and low-voltage power distribution room, motor control centre (MCC), air compressor and nitrogen generation systems, warehouses, etc.
- Designed capacity: 50,000 t/a bio-based nylon 56 / nylon 66 chip and fibre

Youxian Technology (Dandong) Co., Ltd., registered in 2013 with capital of USD14.53 million (RMB100 million), is a high-tech firm with proprietary intellectual property right of nylon 56 fibre. Currently, the company has two production lines producing polyamide, and nylon 56 / nylon 66 from melt-spun nylon short fibre imported from Germany, accounting to 20,000 t/a nylon 56 fibre production capacity in all.

Yibin Grace Hygienic Materials Technology Co., Ltd. resubmitted the construction plan with alteration in production process for its 100,000 bio-based fibre composite new material smart manufacturing project (phase I in Pingshan County) on 29 Aug.

Details of the phase I:

- Construction nature: New construction
- Location: Wangchang Industrial Park of Pingshan County, Yibin City
- Investment: USD44.58 million (RMB306.80 million), 4.55% (=USD2.03 million or RMB13.97 million) of which are for environmental protection
- Site area: 46,669 m²
- Construction content: 6 lines for premium multifunction spunlace non-woven materials, production workshops, public facilities, high and low-voltage switchhouse, feeding weighing machines, and wastewater recycling system for spunlace process, and other environmentally friendly equipment
- Designed capacity: 42,000 t/a premium multifunction spunlace non-woven materials
- Raw and auxiliary materials: viscose fibre, polyester fibre, starch, flocculant, fungicide, hydrophilic agent, etc.
- Overall project status:
 - This 1st phase construction has been operational since mid-March 2022;
 - and the 2nd phase, totalling 68,000 t/a capacity, is now under construction.

Yibin Grace Hygienic Materials Technology Co., Ltd. registered in Aug. 2020 with capital of USD52.31 million (RMB360.00 million), focuses on the production and sale of degradable non-woven materials and the related products, high-performance fibre and composite materials.

Anhui HengRun Chemical Fiber Co., Ltd. revealed its innovative bio-based chemical short fibre project with EI statement on 2 Sept. before submission to the authority.

Project details:

- Construction nature: New construction
- Location: Yingjiang Economic Development Zone of Anqing City, Anhui Province
- Total investment: USD36.33 million (RMB250.00 million), USD0.26 million (RMB1.80 million) of which is for environmental protection
- Site area: 47,898.61 m²
- Construction content: production workshops, warehouse, supporting structures and equipment, back zone drafting set, drafting combination machine, screw extruder, spinneret, and other production and testing equipment
- Designed capacity: 25,000 t/a innovative bio-based chemical short fibre





Anhui HengRun Chemical Fiber Co., Ltd. was registered in July 2014 with capacity of USD2.18 million (RMB15.00 million), and operates in chemical fibre technology R&D, production and sale, as well as selling of textile raw materials and products, costume accessory materials, textile machinery and equipment.

BBCA Biochemical drafts 5,000 t/a D-lactic acid and 3,000 t/a PLA industrialisation projects

Summary: On 6 Sept., BBCA Biochemical published an EIA report (exposure draft) of its 5,000 t/a D-lactic acid industrialisation demonstration project and the 3,000 t/a PLA industrialisation demonstration project.

On 6 Sept., the environmental impact (EI) report (exposure draft for comments) for the 5,000 t/a D-lactic acid industrialisation demonstration project and the 3,000 t/a polylactic acid (PLA) industrialisation demonstration project of Anhui BBCA Biochemical Co., Ltd. (BBCA Biochemical), a subsidiary of China BBCA Group Corporation (BBCA Group), was posted on the homepage of the People's Government of Guzhen County, Bengbu City, Anhui Province.

Details of the 5,000 t/a D-lactic acid industrialisation demonstration project:

- Construction type: new construction
- Construction location: Guzhen Economic Development Zone, Bengbu City, Anhui Province
- Construction content: rent standard plants with ancillary facilities such as fire-fighting, environmental protection and power supply, and purchase fermenters, separators, filters and other devices
- Product programme: 5,000 t/a of D-lactic acid and 4,500 t/a of byproduct gypsum
- Investment: USD16.42 million (RMB113 million), of which 12.48% (=USD2.05 million/RMB14.10 million) will go for environmental protection
- Working system: 80 people in three 8-hour shifts for 300 days a year
- Production technique: The project will be a continuous production using the biological fermentation method. It will produce lactic acid from glucose (substrate) and D-lactic acid bacteria strain through fermentation, extraction, refining and other processes

Details of the 3,000 t/a PLA industrialisation demonstration project:

- Construction type: new construction
- Construction location: Guzhen Economic Development Zone, Bengbu City, Anhui Province
- Construction content: rent standardised plants with ancillary facilities such as fire-fighting, environmental protection and power supply, and procure equipment like distillation tower, crystallizer, and polymerisation tower
- Product programme: 3,000 t/a of PLA and 1,000 t/a of byproduct racemic lactic acid
- Investment: USD16.42 million (RMB113 million), of which 7.74% (=USD1.50 million/RMB10.30 million) will go for environmental protection
- Working system: 80 people in three 8-hour shifts for 300 days (7,200 hours) a year
- Production technique: The project will adopt a two-step approach (ring-opening polymerization of lactide) to synthesise PLA. The project will use D-lactic acid as the starting raw material, dehydrate lactic acid molecules by pressing and heating to first produce lactide with initiators or catalysts, and then produce PLA after purifying, extracting, and concentrating the lactide.

It is understood that the abovementioned two projects are the first phase of the 10,000 t/a D-lactic acid & 5,000 t/a poly-D-lactic acid project announced previously by BBCA Biochemical. Those projects are designed to improve BBCA Group's industrial chain and maximise the value of raw materials. To reflect its circular economy concept and meet the requirements of clean production, the





enterprise will provide its subsidiary Anhui BBCA Taifu PLA Co., Ltd. (BBCA Taifu) PLA products (made from its D-lactic acid) to produce bio-fibres.

Up to now, BBCA Group's existing or under-construction lactic acid and PLA production capacities include:

- BBCA Biochemical: It launched production lines for lactic acid (5,000 t/a) and PLA (3,000 t/a) in Nov. 2019.
- Anhui BBCA Futailai Lactic Acid Co., Ltd. (BBCA Futailai): Its 150,000 t/a lactic acid & 100,000 t/a PLA project was fully put into production in Dec. 2021.
- BBCA Taifu: Its 500,000 lactic acid project and the 300,000 t/a PLA project are expected to start production in H2 2022.

Zhangjiagang Jiutai to produce PTT new bio-based material

Summary: On 31 Aug., the EI report of Zhangjiagang Jiutai's 30,000 t/a PTT new bio-based material project was approved.

Jiutai Energy (Zhangjiagang) Co., Ltd. (Zhangjiagang Jiutai)'s 30,000 t/a polytrimethylene terephthalate (PTT) new bio-based material project got approved with the local authority on the environmental impact (EI) report on 31 Aug. The company was founded in March 2007 with a registered capital of USD53.81 million (RMB370.31 million), a division of Inner Mongolia JiuTai Advanced Materials Technology Co., Ltd. in Zhangjiagang, Jiangsu. According to the publicised report, the company's 300,000 t/a dimethyl ether (DME) project has stopped production since Nov. 2019 as a result of market factors and weak profitability. In 2020, it decided to swift focus on the new bio-based material, PTT.

This 30,000 t/a PTT new bio-based material project takes renewable products as raw materials and features a cleaner production, which helps to protect the environment and achieve sustainable development. The project product PTT polyester chips, is expected to be with properties including good dyeability, biodegradability, stain and UV resistance, elasticity and similar toughness as nylon, and be an upgraded version of the traditional polyester and polyamide chips (polyethylene terephthalate (PET), polybutylene terephthalate (PBT), polyamide 6 (PA6), polyamide 66 (PA66)).

Overview of PTT project:

- Construction nature: Reconstruction (of the establishment of the 300,000 t/a DME project)
- Location: Jiangsu Yangtze River International Chemical Industrial Park
- Total investment: USD45.06 million (RMB310.10 million), of which USD2.91 million (RMB20.00 million) are for environmental protection, accounting for 6.45%
- Area: Around 6.67 ha (100 mu) of the existing factory
- Construction period: 24 months
- Product scheme: PTT polyester chips (30,000 t/a), in types of super bright, semi dull and full dull
- Labour quota: 110 employees
- Working system: Three eight-hour shifts (24-hour workday), totalling 333 working days (=8,000 working hours) annually

Highlights:

- Zhangjiagang Jiutai introduces China Textile Academy (CTA)'s PTT production technique—the production routes and equipment that adopt the "low-temperature and short-process polyester technology" and use 1,3-propanediol (PDO) and purified terephthalic acid (PTA) as raw materials and titanium-based catalysts to produce fibre-grade PTT polyester melts and chips through continuous





pulping, esterification and polycondensation. This technique can shorten the time when the materials are under high temperature, reduce generation of by-products and improve the quality of PTT.

- This project complements the industrial chain nearby, which is in line with the goals of building industrial clusters and fostering recycling, green and integrated development.
 - Constructing this project in Jiangsu Yangtze River International Chemical Industrial Park secures the raw and auxiliary materials the company needs. PDO, the raw material in the project, will be sourced from Guangzhou Guohong New Material Co., Ltd., which produces PDO of consistent, high quality. Besides, Zhangjiagang Glory Biomaterial Co., Ltd. located in the same industrial park and Shenghong Holding Group Co., Ltd. nearby also have production capacity for PDO.
 - Companies such as Taiko Palm-Oleo (Zhangjiagang) Co., Ltd. and Dongma Palm Industries Zhangjiagang Co., Ltd. readily supply glycerol, as there are companies like Vopak Terminal Zhangjiagang Ltd. and Zhangjiagang Free Trade Zone Changjiang International Harbor Co., Ltd. engaging the international transportation for major commodities.
 - Strongly backed, this project can also help promote the future extension of the PDO industrial chain.

To sum up, this project can further extend the key part of Zhangjiagang Jiutai's industrial chain, expand its production capacity and scale and increase the added value of products and its pricing power in the market. Moreover, it can also help facilitate the transition of textile, chemical fibre, home textile and industrial products to be more functional with a higher grade, thus further improving the company's awareness around the globe.

Publicity of bio-based projects of Jinzhu New Material and Anhui Huizhu

Summary: In Aug., the EI reports for the bio-based new material (bamboo-based cellulose) constructions of Jinzhu New Material and Anhui Huizhu were posted for public review, the 1st phase of each accounts for capacity of 100,000 t/a.

Anhui Jinzhu Biobased New Material Co., Ltd. (Jinzhu New Material)

On 11 Aug., the environmental impact (EI) report of the 300,000 t/a bio-based new material and 50,000 t/a fibre moulding project (1st phase) of Jinzhu New Material, was publicised.

Overview of the 300,000 t/a bio-based new material and 50,000 t/a fibre moulding project (1st phase)

- Construction nature: New construction
- Location: Economic Development Zone of Yeji District, Lu'an City, Anhui Province
- Investment: USD63.06 million (RMB434.00 million), 7.5% (USD4.72 million or RMB32.50 million) of which are for environmental protection
- Site area: 79,444 m²
- Construction content: one workshop of bio-based new material, and supporting complex, office buildings, warehouses, etc.
- Designed product and capacity:
 - Major product: bio-based new material (bamboo-based cellulose)—100,000 t/a
 - By-product: lignin—7,230 t/a; biomass pellet—23,500 t/a
 - Note: The phase I removes building of the originally proposed capacity of "10,000 t/a fibre moulding".
- Working system: 150 employees rotating in three 8-hour shifts per day for 340 days in a year

Anhui Huizhu Bio-based New Material Co., Ltd. (Anhui Huizhu)

Later on 18 Aug., the EI report of the 600,000 t/a bio-based new material project (1st phase) of Anhui Huizhu was accepted and disclosed





by the local authority.

Overview of the 600,000 t/a bio-based new material project (1st phase)

- Construction nature: New construction
- Location: Cai Cun Town, Jing County, Xuancheng City, Anhui Province
- Investment: USD72.65 million (RMB500.00 million), 6.4% (=USD4.65 or RMB32.00) of which are for environmental protection
- Site & floor areas: 133,333 m² & 95,157.84 m²
- Construction period (estimated): Sept. 2022–Aug. 2023 (12 months)
- Designed product and capacity:
 - Major product: bio-based new materials (bamboo-based cellulose)—100,000 t/a
 - By-product: lignin—31,700 t/a
- Working system: 150 employees rotating in three 8-hour shifts per day for 330 days in a year

According to the report, the complete project is planned over three phases with investment totalling USD463.71 million (RMB3.19 billion), land use of 53.33 ha (800 mu) and floor area of 600,000 m².

Complete construction plan for the project:

- Phase I: one 100,000 t/a production line, main structures including 3 workshops of bio-based new material, and supporting equipment and facilities, such as wastewater treatment and recycling system, power utilities, R&D office
- Phase II: two 100,000 t/a production lines, main structures including workshops of lignin and 3D printing material, power house
- Phase III: three 100,000 t/a production lines, main structures including 3 workshops of bio-based new material, and warehouse of finished products

The two projects abovementioned adopt the core technology of bamboo-based new material—ultrasonic airflow separation—and can greatly improve the utilisation rates of local rich bamboo resources, agricultural and forestry waste scraps, which is environmentally friendly and in line with the requirements of cleaner production. This technique is developed by Jiangxi Zhongzhu Biomass Technology Co., Ltd. which is constructing the 3rd phase (150,000 t/a) of its 300,000 t/a bio-based new material project presently, after the formed capacities of 50,000 t/a in the 1st phase and 100,000 t/a in the 2nd phase. The bamboo cellulose made by this technique is applicable to the manufacturing of bamboo fibre and home textiles, and the lignin can be used in 3D printing materials.



Price Update

TABLE 3: Average market prices of major raw materials of bio-based materials in China, July–Sept. 2022

No.	Product	Price, USD/t
1	Sugarcane	147.87
2	Corn	403.72
3	Wheat	455.40
4	Bagasse	51.16
5	Corn cob	82.15
6	Wheat straw	80.97
7	Corn stover	83.08

Source:CCM

TABLE 4: Average ex-works prices of major bio-based materials in China, July–Sept. 2022

No.	Product	Price, USD/t	Remark
1	PHA (Polyhydroxyalkanoates)	9,009	Films
2	PBS (Polybutylene succinate)	5,808	Extrusion grade and injection moulding
3	PPC (Propylene carbonate)	4,100	Injection moulding
4	PLA (Polylactic acid)	3,433	Injection moulding
5	PVA (Polyvinyl alcohol)	2,796	Flocculent
6	Starch-based material	3,345	Film moulding
7	PTT (Polytrimethylene terephthalate)	3,495	Fibre

Source:CCM



News in Brief

Angel Yeast and Weigou Workshop to co-found China's biggest 30,000 t/a PHA production base

In July, Angel Yeast Co., Ltd. (Angel Yeast) and Beijing Weigou Workshop Biotechnology Co., Ltd. (Weigou Workshop) inked a cooperative agreement for co-founding Hubei Weiqi Biotechnology Co., Ltd. (working title) to be registered with USD14.53 million (RMB100 million, 40% from Angel Yeast and 60% from Weigou Workshop), which will be responsible for constructing and operating a 30,000 t/a polyhydroxyalkanoates (PHA) production base in Yichang City, Hubei Province, for biosynthesis and industrial development. A 5,000 t/a PHA production line will be set up as trial production for the project and put on stream this year, according to the plan.

Once constructed, this base will hold the China's biggest production capacity of PHA. Additionally, it is designed to produce the most extensive varieties of PHA compared with the worldwide producers, based on the "Next-generation Industrial Biotechnology Platform" of Weigou Workshop, which facilitates industrialisation of dozens of materials compounding lab-developed PHB and P34HB, including but not limited to PHB, P34HB, P34HBHV, PHBHHx, PHB5HV, P3HP3HB, P4HB, PHBV, PHA terpolymer, and functional PHA. Strengths of the both sides will be consolidated in developing the project:

- Angel Yeast: 36 years since its establishment of self-developed biotechnological results alongside the integrated strengths in the global yeast industry.
- Weigou Workshop: Almost 37 years of development of "Next-generation Industrial Biotechnological System" of R&D team from China's Tsinghua University, pivoting on bacterial strains.

Huakang Pharma planning 2 million t/a corn processing project including LA and PLA

On 11 Aug., Zhejiang Huakang Pharmaceutical Co., Ltd. (Huakang Pharma) announced plan to sign a "Project Investment Agreement" with Zhejiang Dinghai Industrial Park Management Committee for the implementation of a "2 million t/a corn deep-processing project" over two phases. Later on 6 Sept., the company issued USD143.85 million (RMB990 million) worth of convertible bonds for funding the project's phase I work.

Overview of the project:

- Construction nature: New construction
- Location: Dinghai Industrial Park, Zhoushan City, Zhejiang Province
- Construction unit: Zhoushan Huakang Biotechnology Co., Ltd., a wholly-owned subsidiary of Huakang Pharma
- Phase I investment: USD360.19 million (RMB2.48 billion), including the funding from bond issuance
- Phase I construction capacity and period: 1 million t/a corn deep-processing capacity in 5 years breaking down to two stages (2 years + 3 years)
- Product scheme: With corn as the raw material, this project intends to produce starch-based sugars/sugar alcohols, dietary fibre, modified starch and other corn deep-processing products and produce psicose, lactic acid (LA) / polylactic acid (PLA), amino acids and other products using green synthesis.

Huakang Pharma specialises in the R&D, production and sale of functional sugar alcohols and starch-based sugars. This 2 million t/a corn deep-processing project is expected to help the company expand product mix, increase market competitiveness, and be conducive to its strategic development in the long run.





CellUranics closes tens of millions RMB of angel financing

On 22 Aug., Jiangsu CellUranics New Material Technology Co., Ltd. (CellUranics) completed tens of millions RMB of angel financing, co-invested by Sequoia China Seed Fund and Asia Green Fund. The fund is set to be used for team expansion, follow-up R&D, and international patent applications.

CellUranics was founded in Oct. 2020 by Guo Neng, professor in Northwestern University in the US with years of experience in the chemical industry that spans across R&D and business, and has developed the world's leading synthesis process of biomass to 2,5-furandicarboxylic acid (FDCA) using glucose as raw material and glucaric acid as intermediate, the production cost of which is proved to close to that of purified terephthalic acid (PTA). Besides, it represents the following advantages:

- High conversion rate: 1 tonnes FDCA costs less than 2 tonnes glucose
- Cheaper raw material: glucose, low-priced and easily found in various sources vs. fructose, its counterpart, used in the comparable production route
- Compatibility: CellUranics's continuous production process is compatible with the existing PTA production process; this means PTA production facilities can be transferred into FDCA production, saving spending on brand new equipment.

CellUranics also plans to send out kilograms of FDCA as samples to potential downstream customers and kicks off pilot-scale production project (25 t/a FDCA) in this H2; for long-term plan, construct and operate one FDCA plant with 5,000 t/a capacity by 2025 and additional 500,000 t/a by 2028.

GS Biotech's bio-based degradable materials base project kicks start construction

On 30 July, GS Biotech's bio-based degradable materials R&D and production base project kicked start construction, which is planned by its subsidiary Zhongke Guosheng (Taixing) New Material Technology Co., Ltd.

Project Overview:

- Total investment: USD185.99 million (RMB1.28 billion)
- Location: Taixing Economic Development Zone, Jiangsu Province
- Site area: 7.6 ha (114 mu), 3.6 ha (54 mu) of which is designed for the phase I
- Designed product: Bio-based materials like 5-Hydroxymethylfurfural (HMF), 2,5-Furandicarboxylic acid (FDCA), 2,5-Bishydroxymethyl tetrahydrofuran (THFDM), polyethylene furanoate (PEF), and other bio-based platform chemicals
- Phase I construction period (estimated): Oct. 2022–Nov. 2023
- Economic evaluation: Annual sales and tax revenue are estimated to be USD508.57 million (RMB3.5 billion) and USD55.22 million (RMB380 million) respectively, once the project reaches its full production capacity.

Wang Lei, founder of GS Biotech, indicated that the company would possess over 10,000 t/a capacities of HMF, FDCA and the derivatives in total, and be able to bring the production cost of HMF down to USD2,906/t (RMB20,000/t) from the current USD7,265/t (RMB50,000/t) after this project's construction is completed and starts operation in 2023, along with foreseeable lower costs of the derivatives. Earlier in July 2022, GS Biotech completed delivery of over 1 tonne of FDCA, which is China's largest batch to date.





With bio-based platform chemical (i.e. HMF) as core product and furan-containing bio-based materials as R&D and production focus, GS Biotech has led the world in HMF production with self-developed continuous production process enabling scale production and lower costs, and helps open up the whole industrial chains starting from monomers to downstream application.

Huaheng Biotech pushes SA and PDO industrialisation

Anhui Huaheng Biotechnology Co., Ltd. (Huaheng Biotech) unveiled plans to accelerate industrialisation of bio-based succinic acid (SA) and 1,3-propanediol (1,3-PDO) technologies on 13 Sept.

Key takeaways

- Huaheng Biotech proposed to reach a Technology License Contract which would give it 20-year exclusive use of the bio-fermentation technology for SA industrial production, owned by Hangzhou Ouhe Biotechnology Co., Ltd. (Ouhe Biotech). This technology has gone through lab-scale experiment—three fermentation tests repeated in 5L fermentation tank with results of SA production of above 80g/L and sugar-acid conversion of above 95%; each fermentation test spanned 70 hours maximum.
- To propel the application of fermentation method for PDO, the company intends to add USD1.45 million (RMB10 million) capital in Tianjin Zhihe Biotechnology Co., Ltd., which will make it the actual controller with 25% of share equity after the capital increase.
- It also cited its R&D chains of advanced and highly-efficient technology integrating stain cultivation, fermentation and extraction, and production application, and laying a firm foundation for its planning of SA and PDO industrialisation (via fermentation method). For further development, it aims to upgrade and iterate the current production techniques and shore up implementation associated with the related industries once mature technical conditions are available.

Puyang Baiaomaisi initiates operation of 50 t/a FDCA pilot-scale equipment

On 14 Sept., Puyang Baiaomaisi Biotechnology Co., Ltd. (Puyang Baiaomaisi) announced its 50 t/a 2,5-furandicarboxylic acid (FDCA) pilot-scale equipment had wrapped up construction work and started operation in Aug. It also plans to set off construction of 1,000 t/a FDCA production capacity in Jan. 2023 and place it on production by the end of the year.

Puyang Baiaomaisi has developed a FDCA production process using fructose as starting material and with support of core technology of crude 5-Hydroxymethylfurfural (HMF) oxidation. Adopting this process can effectively remove impurities during the dehydration of fructose and improve the purity of 5-HMF—fructose goes through dehydration and condensation, then enters the oxidation system, in which polymer-grade PFCA of 99.9% purity is refined and formed. Apart from that, Puyang Baiaomaisi has also created the Tanks-in Series Mode for continuous synthesis of HMF to maximise yield and purity of crude HMF.

To control production costs, the company cooperates with world's leading fructose producers for supply of industrial-grade fructose. It indicates that once its production ramps up, bio-based material price could come down to the same level as the price of petroleum-based materials. Meanwhile, its production of fructose-based FDCA intermediates exhibits strengths in technology and cost benefits and potential to scale up the national industries of FDCA and the FDCA polyesters.

Puyang Baiaomaisi was incorporated in July 2022 and is specialised in R&D and production of FDCA with aim to boost FDCA production from lab scale to pilot scale. Its parent company Anhui Sino Carbonylation Industrial Technology Co., Ltd. mainly engages in R&D,





production and sale of monomers of fluorine-containing polyimide (FPI) , liquid crystal monomers (mainly intermediates), FDCA and the bio-based chemicals derived from FDCA.

Zhongshan Co-polymer approved for starch-based biodegradable material project

On 6 Sept., Co-polymer New Materials (Zhongshan) Co., Ltd. (Zhongshan Co-polymer) received approval for its project's environmental impact assessment document.

Project details:

- Construction nature: New construction
- Location: Ruiqi Industry Park, Dache Village, Nanlang Subdistrict, Zhongshan City
- Investment: USD440,000 (RMB3 million), 16.7% (=USD7,265 or RMB500,000) of which are for environmental protection
- Site area: approx. 900 m²
- Product programme: 165 t/a modified plastic, 175 t/a starch-based biodegradable material, and 202 t/a plastic masterbatch
- Working system: 12 employees working for 8 h/d for 300 days per year

Zhongshan Co-polymer was founded on 13 June, 2022 with a registered capital of USD0.44 million (RMB3.00 million). Its business contains manufacturing and sale of plastic products, bio-based materials, engineering plastic and synthetic resins.



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