

Bio-based Material Quarterly Newsletter

Q2 2022

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Contents

Headline	1
Editor's Note	3
Governmental Direction	4
China's first five-year bioeconomy development plan launched	4
China issues the Key Tasks of Plastic Pollution Management for 2022	4
Market Analysis	7
eSUN initiates 30,000 t/a lactide and 110,000 t/a biodegradable materials projects	7
Kingfa & Jindan Technology discloses earnings of 2021 and Q1 2022	8
COFCO Biotech boasts PHA and PLA industrial setups	10
Advance of China's PLA projects	11
Company Dynamics	14
BBCA Group expanding operation in bio-based material sector across China	14
Golden Far East's 100,000 t/a lactide / PLA and 200,000 t/a LA project publicised	15
Huaфон Group moves up bio-based and biodegradable materials business planning	16
Huitong Technology adding strength in PLA and biodegradable plastic industries	17
Price Update	20
Brief News	21
Yuanli Chem launches BDO on European market	21
Zhuhai MedPHA closes USD10.5 million+ financing	21
Huaheng Biotech signs diacid- and diol-oriented production project agreement	22
Anhui Huizhu kicks off 600,000 t/a bio-based new material project construction	22
Qinghai Tianjinze's thermoplastic starch-based material production project revealed	23
EIA report of Huaibei Chuangxin's 5,000 t/a bio-based succinic acid project accepted	23
Tidetrion Biotech pushes 1 million+ t/a bio-based PBS project	24





Headline

On 10 May, China rolled out its first systematic five-year plan for development of bioeconomy encouraging application of green, low-carbon biomass-derived substitutes.

Most recently, the National Development and Reform Commission and the Ministry of Ecology and Environment of China jointly issued the Key Tasks of Plastic Pollution Management for 2022, followed by a series of launches of provincial- and municipal-level plans.

In early April, eSUN carried forward with an easily recyclable, degradable new materials master project encompassing the 30,000 t/a high-gloss pure lactide and 10,000 t/a lactate esters integrated project, and the 110,000 t/a degradable materials and 33,000 t/a lactate esters project—the record filings of the two projects have been approved.

In 2021 and Q1 2022, Kingfa suffered a sagging net profit, in contrast to Jindan Technology's visible growth in revenue and profit; and both have made progresses in the biodegradable material sector during the period.

Recently, COFCO Biotech release booming financial results of 2021 and announced its 1,000 t/a pilot-scale PHA installation project had made a successful start in trial run in June, meaning the company has turned capable of industrialising both PLA and PHA.

As the plastic ban is gaining ground in China, the domestic PLA industry has been joined by many who brought up three new projects under construction and one into technological upgrade in Q2.

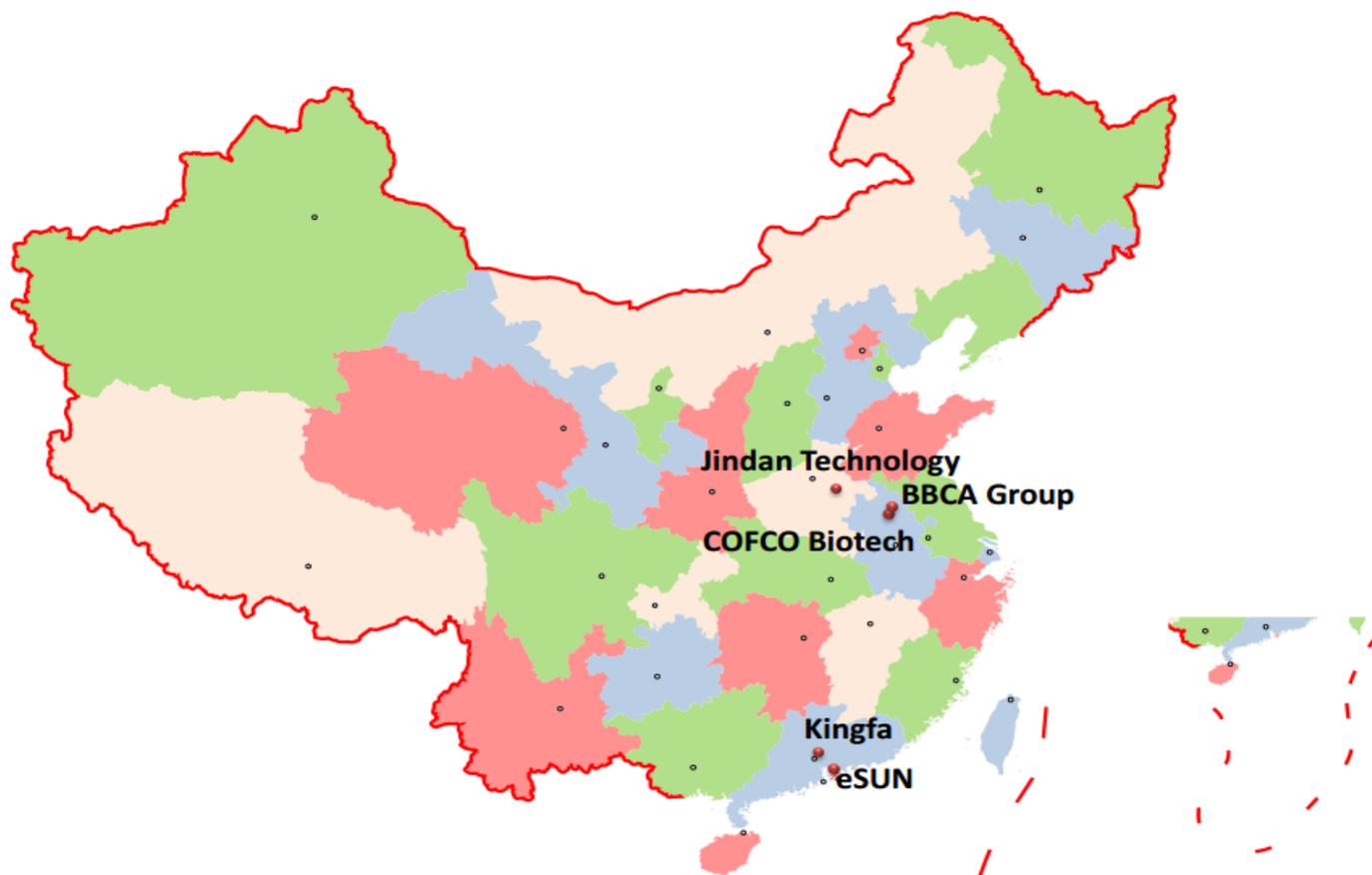
In May–June, BBKA Group raised three construction proposals centred around bio-based materials in Hainan, Heilongjiang and Anhui provinces, along with other ongoing bio-based material projects across China.

On 30 May, the draft report on environment assessment of the 100,000 t/a lactide / polylactic acid (PLA) and 200,000 t/a lactic acid (LA) project of Shouguang Golden Far East Modified Starch Co., Ltd. (Golden Far East) was open for public review.

In this quarter, Huafon Group Co., Ltd. has accelerated its planning in the area of bio-based and biodegradable materials, with its 600,000 t/a high-performance biodegradable new material project disclosed in April and successful acquisition of DuPont's bio-based PDO and PTT operations in early June.

In April, Huitong Technology's 105,000 t/a biodegradable PLA plastic and the series products R&D and production project passed the local authority's checks on the environmental impact; in June, the company brought up the IPO prospectus (application draft) for USD37.85 million (RMB252.30 million) funding, looking to move further in the technology R&D of new polymer materials, biodegradable materials and CCUS (carbon capture, utilisation and storage).







Editor's Note

Welcome to the Bio-based Material Quarterly Newsletter Q2 2022.

Policy

In Q2, China rolled out its first systematic *Plan for Bioeconomic Development during the 14th Five-year Development Plan Period (2021-2025)*; in addition, the National Development and Reform Commission and the Ministry of Ecology and Environment jointly issued the *Key Tasks of Plastic Pollution Management for 2022*, followed by a series of launches of local plans in provinces and cities.

Market dynamics & company performance

eSUN started up an easily recyclable, degradable new materials master project; and BBKA Group was also expanding operation in bio-based material sector across China along with Huafon Group and Huitong Technology accelerating layout in bio-based and biodegradable material sectors.

Multiply PLA projects are advancing in China including the ones of Golden Far East and Jiangxi Keyuan preparing for construction starts and that of Shandong Guoan, Shandong Kunxiang, Jiangsu Shengpuli and Ma'anshan Tong-Jie-Liang Biomaterials under construction. On the other hand, Kingfa's net profit tumbled in 2021 and Q1 2022 while Jindan Technology's revenue and profit marked significant growths; COFCO Biotech came with booming financial results for 2021 and a successful trial run in its 1,000 t/a PHA project launched in June.

There are updates on other bio-based material projects including Anhui Huizhu's 600,000 t/a bio-based new material project, Qinghai Tianjinze's thermoplastic starch-based material production project, Huaibei Chuangxin's 5,000 t/a bio-based SA project, Tidetron Biotech's 1 million+ t/a bio-based PBS project, and Huaheng Biotech's diacid- and diol-oriented production project; moreover, Yuanli Chem probes the BDO market in Europe and Zhuhai MedPHA closed USD10.5 million+ financing for product innovation and marketing campaigns in China and overseas.

Price

In the second quarter of 2022, the downtrend in PLA prices sustained while PHA was able to stand firm.

The USD/CNY exchange rate in this newsletter is USD1.00=CNY6.6651 on 1 June, 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's first five-year bioeconomy development plan launched

Summary: On 10 May, China rolled out its first systematic five-year plan for development of bioeconomy encouraging application of green, low-carbon biomass-derived substitutes.

On 10 May, China's National Development and Reform Commission launched the *Plan for Bioeconomic Development during the 14th Five-year Development Plan Period (2021-2025)* approved by the State Council, which underlines bio-manufacturing in its pushing strategic development of the emerging industries in the bioeconomy sector.

Key focus

This plan points out four key focuses of biomedicine, bioagriculture, application of biomass-derived substitutes, and prevention and control of biosafety risks, including higher attention on the progress of bio-based materials, new-type fermented products and biomass, and on the development of biomass recycling technologies, production as well as consumption system.

Detailed content

- Deepen innovation and cooperation in bioeconomy:
 - support initiation or participation of domestic research institutions in scientific programmes related to innovation and application of generic technologies in key areas like bio-based environmentally-friendly materials and biomass with the international counterparts;
- step up the development of bioenergy and bioenvironmental protection industry:
 - highlight product development of high-performance bioenvironmentally-friendly materials and biological agents, functional microorganisms, enzyme preparations in pursuing higher level of environmental protection and pollution governance;
 - carry out technology research and development projects of new-type biomass to impel more use of green, renewable energies instead of fossil fuel.
 - Bioenvironmental area is urged to promote the application of biodegradable materials in manufacturing of daily necessities, agricultural films, packages, textiles, and to produce better cost-effective, quality products;
 - Bioenergy area is urged to establish industrial demonstration zones linked to ligno-cellulosic bioethanol, biodiesel, bio-natural gas (BNG) that integrate biomass material gathering, organic fertiliser production and application, in order to expand the domestic production scale of biofuels.
- Improve the development and utilisation system of biological resources:
 - innovate recycling technologies of biological resources and explore an integrated application mode of biological resources from resources collecting, storing, forming to consuming, disposing and recycling.
- Renovate policy environment that favours the technology and talent development and aligns with the international levels
 - allow more extensive use of bio-based degradable materials in markets with launches of corresponding assessment and identification standards;
 - increase national and regional financial aids to play out more comprehensive policies for biomass industry;
 - support and cultivate listing of biotech businesses in domestic capital market; and invite well-performing enterprises to go public;
 - establish pilot zones of bioeconomy in cities of higher economic development levels, such as ones in the Beijing-Tianjin-Hebei Region, Yangtze River Delta region, Guangdong–Hong Kong–Macao Greater Bay Area, and Chengdu–Chongqing economic circle.





China issues the Key Tasks of Plastic Pollution Management for 2022

Summary: Most recently, the National Development and Reform Commission and the Ministry of Ecology and Environment of China jointly issued the *Key Tasks of Plastic Pollution Management for 2022*, followed by a series of launches of provincial- and municipal-level plans.

To step up the control on plastic pollution across the county, the National Development and Reform Commission and the Ministry of Ecology and Environment of China jointly promulgated the *Key Tasks of Plastic Pollution Management for 2022* (hereafter referred to as the Key Task) recently, after the issues of the *Opinions on Further Strengthening the Control of Plastic Pollution* and the *Action Plans for Plastic Pollution Control during the 14th Five-year Development Plan Period (2021–2025)*.

The Key Tasks summarise China's achievements in 2021, pointing out that preliminary results have been seen in the control of plastic pollution throughout industrial chains including efforts in reducing pollution volume at its source, enhancing industrial capacity of plastic substitutes, slashing the usage of disposable tableware in food delivery industry, increasing the utilisation rates of reusable plastic bags between package deliver stations up above 90% as well as the recycling level of plastic wastes including the agricultural film recovery which hit 80% nationwide last year.

It also urges departments to act on the requirements for biodegradable material sector accenting product certification, core technology, standard development, package for agricultural use and supervision in 2022. Details are listed below:

Reduction of plastic products at its source

- Deepen inspection on industrial links from production to sale:
 - ban production and sale of extra-thin plastic bag (thickness<0.025 mm), polyethylene (PE) film for agricultural use (thickness<0.01 mm) and single-use (disposable) foaming plastic tableware;
 - develop a certification and labeling system for green products and promote the use of reusable raw materials and the product recycling;
 - support projects that aim at breakthroughs in key degradable plastic core technologies and commercialisation of technological achievements, and formulate certification and labeling standards of degradable materials, to improve product quality and performance.
- Reinforce governance of parcel package:
 - include green packaging materials in the scope of green product certification to build a greener parcel delivery business;
 - pilot large-scale application of recyclable parcel packages across industries.

Governance of agricultural film and pesticide package

- Use and recycle agricultural film scientifically with focuses on the promotion of fully biodegradable agricultural film and thickened high-strength agricultural film in key areas that usually consume large amount of agricultural film;
- Draw up a systematic recycling network that powers effective prevention and control of "white pollution" and ensure the recovery rate of agricultural film staying above 80%.

Inspection on key areas

- Step up law enforcement on monitoring and sampling of plastic bags and film products for agricultural use; if any non-conformity is found, follow-up sampling would be carried out onto those produce the unqualified products;





- Shore up testing capacity and measures of degradable plastics especially checks on misconducts like pseudo-labeling.

In the past two months, such regions, provinces and cities as Inner Mongolia Autonomous Region, Shandong, Shanxi, Beijing and Tianjin have published their local versions of key tasks of plastic pollution management for 2022, based on the central *Key Tasks of Plastic Pollution Management for 2022*, pressing forward measures to control local plastic pollution and defined accountabilities of departments of all levels.





Market Analysis

eSUN initiates 30,000 t/a lactide and 110,000 t/a biodegradable materials projects

Summary: In early April, eSUN carried forward with an easily recyclable, degradable new materials master project encompassing the 30,000 t/a high-gloss pure lactide and 10,000 t/a lactate esters integrated project, and the 110,000 t/a degradable materials and 33,000 t/a lactate esters project—the record filings of the two projects have been approved.

On 7 April, Shenzhen Esun Industrial Co., Ltd. (eSUN) has been approved for the recordings of two projects involving collective investments (estimated) of USD342.08 million (RMB2.28 billion) in the production of easily recyclable, degradable new materials. The two projects, designed in Yichang City of Hubei Province with the construction work to be undertaken by its subsidiary Hubei Yisheng New Material Co., Ltd. (Hubei Yisheng), are expected to ramp up the company's overall production capacity and help it catch up with the increasing market demand for biodegradable materials and related products under China's implementation of plastic restrictions. Details of the two projects are summarised below.

30,000 t/a High-gloss pure lactide and 10,000 t/a lactate esters integrated project

- Construction type: New construction
- Investment: USD42.01 million (RMB280 million)
- Construction period (estimated): May 2022–April 2024

This project works on chemical recycling of polylactic acid (PLA) and higher value application of lactate esters and polyols aiming to improve recycling rate of resources and slash carbon emission.

- The self-developed "X-form" production system by eSUN to be adopted in one production system of this project, uses lactide that are generated from lactic acid (LA) or recycled PLA as intermediates to produce directly, in one way PLA and PLA polyol, or in another, lactate esters.
- Chemical recycling of PLA developed by eSUN is the world-first technique of such kind, untangling the knots in recycling and reutilising biodegradable materials and helping build a "green and circular" economic system in the course of meeting global target of carbon reduction and pursuing sustainable development—eSUN filed a pattern application for "A Preparation Method of refined lactide using recycled PLA" in 2012 and was approved in 2014; at present, the company has put such chemical recycling technique into its industrial production.

110,000 t/a Degradable materials (PLA and PCL (polycaprolactone)) and 33,000 t/a lactate esters project

- Construction type: New construction
- Investment: USD300.07 million (RMB2 billion)
- Construction period (estimated): starting in Aug. 2022

This project focuses on copolymerisation of monomers like lactide, glycolide and caprolactone, as well as modification blending with PLA, polyglycolide, or polycaprolactone for better functional features that can be well applied to a wide range of industries and areas.

Hubei Yisheng is a wholly-owned subsidiary of eSUN, founded in Jan. 2022 and registered with USD1.50 million (RMB10 million) in capital.





eSUN prioritises businesses in 3D printing materials, environmentally-friendly biodegradable materials, capable of producing 10,000 t/a of polymers, 15,000 t/a of lactate esters, 5,000 t/a of polyols, and 5,000 t/a of 3D printing materials currently. In 2021, the company gained USD42.41 million (RMB274 million) in revenue, increasing 33.88% YoY, and USD2.06 million (RMB13 million) in net profit, dropping 17.36% YoY; main businesses' earnings soared 33.7% YoY including 3D printing materials up 37.22% and environmentally-friendly biodegradable materials jumping 53.98%.

Kingfa & Jindan Technology discloses earnings of 2021 and Q1 2022

Summary: In 2021 and Q1 2022, Kingfa suffered a sagging net profit, in contrast to Jindan Technology's visible growth in revenue and profit; and both have made progresses in the biodegradable material sector during the period.

Kingfa Sci. & Tech. Co., Ltd. (Kingfa)

On 26 April, Kingfa released its financial report for 2021 and Q1 2022. Key data is as follows:

- Full 2021
 - Revenue: USD6.22 billion (RMB40.20 billion), up 14.65% YoY
 - Net profit attributable to equity shareholders of the listed company: USD257.06 million (RMB1.67 million), tumbled by 63.78 % YoY
- Q1 2022
 - Revenue: USD1.42 billion (RMB9.46 billion), up 4.42% YoY
 - Net profit attributable to equity shareholders of the listed company: USD63.17 million (RMB421.04 million), continued to fall by 44.93% YoY

TABLE 1: Revenue and operating cost of Kingfa's main business, 2021 vs 2020, million USD

Product name	Revenue			Operating cost		
	2021	2020	YoY Change	2021	2020	YoY Change
Modified plastic products	3,919.83	2,945.56	24.11%	3,146.79	2,174.53	34.96%
New materials products	410.74	253.45	51.12%	271.45	152.99	65.57%
Green petrochemical products	621.22	692.08	-16.29%	575.25	591.05	-9.21%
Medical & healthcare products	236.32	391.14	-43.65%	200.11	93.67	99.39%
Trade goods	942.97	717.05	22.64%	924.55	693.52	24.33%
Total	6,130.93	4,999.28	14.37%	5,118.47	3,705.62	28.82%

Note: 1. Modified plastic products include original modified plastics and environmentally-friendly high-performance recycled plastics;
 2. New materials products include fully biodegradable plastics, specialty engineering plastics, carbon fibre and composite materials;
 3. Green petrochemical products include propylene, isooctane, methyl ethyl ketone and liquefied gas.

Source: Kingfa





Kingfa's modified plastic and new material business performance stand out among others in 2021:

- Sales of finished modified plastic products: 1,745,300 tonnes, up 12.84% YoY
- Sales of finished new material products: 101,900 tonnes, up 29.32% YoY
 - including sales of fully biodegradable plastics reaching 79,700 tonnes, up 22.28% YoY
- During the reporting period, the company has improved its capacity of polybutylene adipate-co-terephthalate (PBAT) up to 180,000 t/a and developed a food contact polybutylene succinate (PBS).
- However, Kingfa made lower sales of fully biodegradable plastics compared with the results from the previous year, due to the hiking raw material 1,4-butanediol (BDO) and international freight fee.

Committed to upgrade its new material operation, Kingfa said it would draw plans for capacity expansion of fully biodegradable plastics and move to widen product distribution and reduce cost, with specific activities for 2022 listed as below:

- continue construction of the 30,000 t/a polylactic acid (PLA) line as scheduled and ready to put it into production in H2;
- gear up for the construction and production initiations of the 120,000 t/a of PBAT and 60,000 t/a PLA lines;
- carry forward with the 10,000 t/a bio-based BDO construction project and put into operation by the end of 2023.

Henan Jindan Lactic Acid Technology Co., Ltd. (Jindan Technology)

On the other hand, Jindan Technology delivered a more encouraging report with details as follows:

- Full 2021
 - Revenue: USD222.55 million (RMB1.44 billion), up by 40.02% YoY which is its biggest annual growth to date;
 - Net profit attributable to equity shareholders of the listed company: USD20.58 million (RMB133 million), up 10.94% YoY;
 - These growths were the results of increased output and sales along with improved selling price of lactic acid (LA).
 - Jindan Technology's revenue has been rising for six straight years from USD88.25 million (RMB586 million) in 2016 up to USD222.55 million (RMB1.44 billion) in 2021.
- Q1 2022
 - Revenue: USD56.71 million (RMB378 million), up 18.18% YoY;
 - Net profit attributable to equity shareholders of the listed company: USD6.48 million (RMB43.19 million), jumped 54.75% YoY.

The salient financial data came out from the company's efforts in building whole industrial chains during 2021, including the following projects:

- The 10,000 t/a lactide project, broke the key technical bottleneck and has started stable production, endowed with the essential conditions to expand to larger scale; the project's buildings have been registered as fixed assets since Jan. 2022, meaning it becomes operational since then. For future growth, Jindan Technology suggested that it would keep upgrade production techniques and get more involved in PLA project.
- The 50,000 t/a high-gross pure L-lactic acid engineering project, on its way to operation start in Q4 2022, has helped boost overall capacity.
- Total USD7.50 million (RMB50 million) investment in incorporating wholly-owned subsidiary Henan Jindan Modern Agricultural Development Co., Ltd. as a corn production base, is to raise competence in securing raw material supply.
- The 60,000 t/a biodegradable polyester (i.e. PBAT) and related products construction project, is well underway and has completed the purchase of main equipment.

In 18 May, 2022, Jindan Technology unveiled investment plan for establishment of a wholly-owned company focusing on LA strain cultivation and LA biotechnology development as well as technical research on PLA and polyhydroxyalkanoates (PHA).



Regardless of the challenges imposed by the macro-environment, Jindan Technology has benefited from the implementing Action Plan for Plastic Pollution Governance during the 14th Five-year Development Plan period (2021-2025) and seen new growth drivers for its PLA, PBAT, modified starch and other biodegradable material businesses.

COFCO Biotech boasts PHA and PLA industrial setups

Summary: Recently, COFCO Biotech release booming financial results of 2021 and announced its 1,000 t/a pilot-scale PHA installation project had made a successful start in trial run in June, meaning the company has turned capable of industrialising both PLA and PHA.

On 29 April, COFCO Biotechnology Co., Ltd. (COFCO Biotech) disclosed its annual report of 2021 with the following key results:

- Revenue: USD3.63 billion (RMB 23.47 billion), up 17.88% YoY
- Net profit attributable to equity shareholders of the listed company: USD175.35 million (RMB1.13 billion), jumped by 91.06% YoY which is a 3-year record growth

TABLE 2: Revenue split of COFCO Biotech by main product, 2021 vs. 2020

Product category	2021		2020		Trend
	Revenue, million USD	Proportion	Revenue, million USD	Proportion	
Fuel ethanol and by-products	1,725.76	47.51%	1,388.20	48.31%	15.94%
Starch and by-products	673.53	18.54%	599.56	20.86%	4.78%
Sugars	533.47	14.69%	362.28	12.61%	37.34%
Monosodium glutamate (MSG) and by-products	190.98	5.26%	161.51	5.62%	10.25%
Citric acid, citrates and by-products	175.81	4.84%	102.33	3.56%	60.30%
Oils	117.77	3.24%	105.8	3.68%	3.93%
Others	163.89	4.51%	59.9	2.09%	155.00%

Source: COFCO Biotech

During the reporting period, COFCO Biotech's strong earnings benefited from its efforts in optimising product structure and upgrading business operation against an assortment of unfavourable factors, such as the long and gloomy economy across the globe, the resurgence of COVID-19 infections in China and the consequent price surges of raw and auxiliary materials.

- Category optimisation: its priority of high value-added products helped boost the sales growth of differentiated products like specialty starch, specialty starch sugar, specialty ethanol and specialty citric acid to a record high.

In addition to businesses of bio-energy, food materials and ingredients, COFCO Biotech covers degradable materials including polyhydroxyalkanoates (PHA), polylactic acid (PLA), PLA-based modified materials and PLA products. Last year, the company's



biodegradable material front met a substantial progress in integrating biodegradable material business layout by kicking off the construction of the 1,000 t/a pilot-scale PHA installation project, and the 30,000 t/a lactide project planning to get into trial run in H2 2023, plus its previously established 30,000 t/a capacity of raw PLA materials and PLA products.

On 6 June, COFCO Biotech stated that the phase I construction of the 1,000 t/a PHA production line project had reached the production target in trial run. This project broke ground on Aug. 2021, ended construction phase and started trial production in May 2022, and has produced conforming products a short time ago.

Overview of the 1,000 t/a pilot-scale PHA installation construction and technical upgrade project

- Executive entity: COFCO Bio-Chemical and Bio-Energy (Yushu) Co., Ltd.
- Investment: USD4.48 million (RMB29.85 million)
- Location: Changchun City, Jilin Province
- Construction schedule: phase I (200 t/a) and phase II (800 t/a)
- The project adopts advanced production techniques and equipment, and scales up bacteria cultivation, fermentation, and product separation progressively to push biomass and PHA production up to the designed level that meets market demand.

This pilot-scale production line, once comes onstream, means COFCO Biotech's demonstration buildup of the whole industrial chain of bio-based degradable materials in Jilin has taken shape embracing PLA and PHA industrial landscape. On top of that, it has a flexible plan for process adjustment for this project in line with market trend.

COFCO Biotech also mentioned that it would accelerate launching of lactide project to open up the corn-to-PLA industrial links with the goal of realising commercial production of biodegradable materials in the following period, and continue to promote industrial transformation and upgrade such as increase lactide and PLA capacities at an appropriate pace taking into account the development of the PLA market.

Advance of China's PLA projects

Summary: As the plastic ban is gaining ground in China, the domestic PLA industry has been joined by many who brought up three new projects under construction and one into technological upgrade in Q2.

China government has been promoting plastic ban across the country and motivated some firms with strong financial background to start operation in the polylactic acid (PLA) industry in Q2 2022.

- In June, two new large PLA projects, invested by Jiutai Energy Mongolia Co., Ltd. (Jiutai Energy) and Shandong Luwei Pharmaceutical Co., Ltd. (Luwei Pharma) respectively, initiated construction; and Levima Advanced Materials Co., Ltd. (Levima)'s 130,000 t/a PLA project has made a step forward.
- Dating back to April, there were one new PLA construction project and one technological upgrading project launched.

Shandong Guoan New Material Co., Ltd. (Shandong Guoan)

On 18 June, Shandong Guoan held a groundbreaking ceremony for its 500,000 t/a bio-based biodegradable new material project. Project details are as follows:





- Construction nature: New construction
- Location: Economic Development Zone of Luozhuang District, Linyi City, Shandong Province
- Investment: USD790.69 million (RMB5.27 billion)
- Site & floor areas: 46.33 ha (695 mu) & 492,200 m²
- Construction period: June 2022–Dec. 2024
- Main construction content: PLA workshop, succinic acid (SA) workshop, general-purpose warehouse, administrative service centre, and other supporting equipment and facilities
- Designed capacity: 300,000 t/a of PLA and 200,000 of t/a SA

Established in Dec. 2016 with a registered capital of USD150 million (RMB1 billion), Shandong Guoan is a wholly-owned subsidiary of Jiutai Energy. Jiutai Energy is a large corporation of new energy and new material focusing on new coal-based energies, polyester materials and fine chemicals, and has located most of its capacities in Inner Mongolia Autonomous Region.

Shandong Kunxiang Biotechnology Co., Ltd. (Shandong Kunxiang)

On 8 June, Shandong Kunxiang's biodegradable new material industrial park, invested by Bowei Chem (HK) Limited and Shandong Luwei Pharmaceutical Co., Ltd. (Luwei Pharma) with USD1 billion in total, broke ground. The park targets to set up 300,000 t/a capacity of L-lactic acid and PLA products over three phases in an area of 43.67 ha (655 mu). Herein, the 1st phase construction will be in charge by Shandong Kunxiang and details are as follow:

- Construction nature: New construction
- Location: Zichuan District, Zibo City, Shandong Province
- Phase I investment: USD400 million
- Site & floor areas: 7.04 ha (105.67 mu) & 30,000 m²
- Main construction content: around 300 new sets of seed fermenter, fermentation tank, concentrator, decoloriser, MVR concentrator, and devices for molecular distillation, extraction, polycondensation, environmental protection

Founded in 9 Oct., 2021 with a registered capital of USD32.00 million, Shandong Kunxiang prioritises the polymerisation technological R&D, manufacturing and sale of bio-based materials.

Luwei Pharma is one of the leading enterprises in China's vitamin C manufacturing and paving its way towards a world-class vitamin C industrial production base and a world-class biodegradable new material production base in China with its ongoing efforts in advancing development of new industry and extension of product chains.

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

On 1 June, Jiangxi Keyuan's 200,000 t/a lactic acid (LA) and 130,000 t/a PLA project were publicised with the approved environmental impact assessment (EIA) for the third time. Details are as follows:

- Construction nature: New construction
- Location: Lianxi District, Jiujiang City, Jiangxi Province
- Investor: Levima Advanced Materials Co., Ltd. (Levima)
- Total investment: USD447.45 million (RMB2.98 billion)
- Site & floor areas: approx. 28.40 ha (426 mu) & 290,000 m²





- Construction period:
 - Phase I: July 2022–Dec. 2023
 - Phase II: Feb. 2024–Dec. 2025
- Production scale:
 - Phase I: 100,000 t/a LA, 40,000 t/a PLA (one 30,000 t/a high-gloss pure PLA line + one 10,000 t/a low-gloss pure PLA line), 100,000 t/a gypsum plaster and its by-products;
 - Phase II: 100,000 t/a LA, 100,000 t/a PLA (two 50,000 t/a high-gloss pure PLA lines), 100,000 t/a gypsum plaster and its by-products; meanwhile, transforming the 30,000 t/a high-gloss pure PLA line formed in the phase I to a 20,000 t/a low-gloss pure PLA line.

Jiangsu Shengpuli New Material Technology Co., Ltd. (Jiangsu Shengpuli)

On 22 April, Jiangsu Shengpuli held a groundbreaking ceremony for the 55,000 t/a PLA project. Details are as follows:

- Construction nature: New construction
- Location: Suyu District, Suqian City, Jiangsu Province
- Total investment: USD300.07 million (RMB2 billion)
- Investor: Jiangsu Jinghong New Materials Technology Co., Ltd., a Chinese company holding the equipment and technologies to produce PLA "Two Steps" (microwave heating and conventional heating in the ring-opening polymerisation (ROP) of lactide)
- Site area & area of new workshops: 26.67 ha (400 mu) & 150,000 m²
- Designed capacity: 55,000 t/a PLA in total (phase I: 5,000 t/a; phase II: 50,000 t/a)

Ma'anshan Tong-Jie-Liang Biomaterials Co., Ltd. (Ma'anshan Tong-Jie-Liang Biomaterials)

On 7 April, Ma'anshan Tong-Jie-Liang Biomaterials Ltd started construction of the 10,000 t/a bio-based new material PLA technological upgrading project. Details are as follows:

- Construction nature: Technological upgrading
- Total investment: USD75.02 million (RMB500 million)
- Floor area: 20,000 m²
- Construction content: upgrade part of the existing subsystem of the PLA production installation to form capacity of 10,000 t/a bio-based new material PLA.





Company Dynamics

BBCA Group expanding operation in bio-based material sector across China

Summary: In May–June, BBCA Group raised three construction proposals centred around bio-based materials in Hainan, Heilongjiang and Anhui provinces, along with other ongoing bio-based material projects across China.

In May–June, China BBCA Group Corporation (BBCA Group) is taking active moves in bio-based material business layout, proposing three bio-based degradable material projects in Hainan, Heilongjiang and Anhui provinces.

Bio-based Industrial Base in Hainan (to start construction in 2022)

In mid-June, Anhui BBCA Biochemical Co., Ltd. (BBCA Biochemical), a subsidiary of BBCA Group, received investment funds totalling USD45.01 million (RMB300 million) from Hainan Suida Equity Investment Fund Partnership (Limited Partnership) and is planning to set up a subsidiary in Hainan to build up a plant in the province. That will, for one thing, help diversify the local green industrial system and develop a bio-based degradable material industrial hub, for another, respond to Hainan's ban on plastic use.

Hainan Suida Equity Investment Fund Partnership (Limited Partnership) is the first sub-fund of Hainan Free Trade Port Construction Investment Fund Co., Ltd. and focuses on areas like rural revitalisation projects and green industries. Incorporated by Hainan Provincial Government in Jan. 2022, Hainan Free Trade Port Construction Investment Fund Co., Ltd. engages in investments in key industries, key industrial park and major projects located at the local free trade port, and looks set to develop into a 100 billion investment company.

Straw-based Polylactic Acid (PLA) Whole Industrial Chain Project in Heilongjiang

On 27 May, collaborating with the Heilongjiang Provincial Government, BBCA Group brought up a special fund plan—initial fundraising seeks around USD375.09 million (RMB2.5 billion)—to level up the local comprehensive utilisation of straw. This proposed plan suggests to start a China-first PLA bio-based new material whole industrial chain project using agricultural and forestry wastes in a new strain centre set in Heilongjiang, which will leverage the biological technologies self-developed by BBCA Group. The construction of such project will be performed over three phases to form capacities of 800,000 t/a PLA, 1,200,000 t/a of lactic acid (LA) and 1,360,000 t/a straw-based mixed syrup in its entirety.

Bio-based Material Manufacturing Park in Fuyang City, Anhui Province

On 10 May, BBCA Group negotiated and sealed a contract with Hailuo Group Co., Ltd. through a video link. The contractual terms enable USD4.05 billion (RMB27 billion) of investment in co-establishing a bio-based new material manufacturing park with over 100 billion t/a capacities of biomaterials in Linqun County of Fuyang City, Anhui Province, including in modular distributed sugar plants and production projects of polyol, polyurethane (PU or PUR), etc.

As a big player in the bio-based industry, BBCA Biochemical has the edges on corn technologies applicable to whole industrial chain production such as of LA strain cultivation, fermentation, extraction and purification, and PLA polymerisation.





In terms of operation strategy and objective to amplify its PLA capacity to 10 million t/a, BBCA Group has been planning PLA projects across several locations in Heilongjiang, Jilin, Liaoning provinces, Inner Mongolia Autonomous Region and North China, as well as seeking cooperation with large Chinese businesses.

BBCA Group's strategic moves over the recent years:

- March 2019, the company closed a deal on the project of 1 million t/a biological new material PLA with the Economic and Technological Development Zone of Tongliao City, Inner Mongolia Autonomous Region.
 - this project invested with USD1.8 billion (RMB12 billion) in total, was planned to develop over three phases—the 1st phase is to build 500,000 t/a LA capacity and 300,000 t/a PLA with USD750.18 million (RMB5 billion).
- Dec. 2021, BBCA Biochemical registered two subsidiaries with USD259.56 million (RMB1.73 billion) in the whole to execute two projects (both expected to end construction by 2024):
 - 180,000 t/a LA project, undertaken by Shandong BBCA Biotechnology Co., Ltd.;
 - 100,000 t/a PLA project, undertaken by Shandong BBCA Biomaterial Co., Ltd.
- Feb. 2022, Zhongxin Technology (Hainan) Co., Ltd. proposed the 80 t/a fully degradable plastic bag and 2.1 t/a biodegradable drinking straw project.
 - 5% equity shares of Zhongxin Technology (Hainan) Co., Ltd. is owned by BBCA Biochemical's subsidiary through Anhui Qinghai Biotechnology Co., Ltd.
- Headquartered in Guzhen County, Bengbu City, Anhui Province, BBCA Biochemical has continued to underpin its PLA industrial chain development. At present, it has built solid production capacity (100,000 t/a PLA and 150,000 t/a LA), and has new 300,000 t/a PLA and 500,000 t/a LA under construction, set to complete by Q2 2022.

Golden Far East's 100,000 t/a lactide / PLA and 200,000 t/a LA project publicised

Summary: On 30 May, the draft report on environment assessment of the 100,000 t/a lactide / polylactic acid (PLA) and 200,000 t/a lactic acid (LA) project of Shouguang Golden Far East Modified Starch Co., Ltd. (Golden Far East) was open for public review.

On 30 May, Shouguang Golden Far East Modified Starch Co., Ltd. (Golden Far East) posted the draft report on environment assessment of its 100,000 t/a lactide / polylactic acid (PLA) and 200,000 t/a lactic acid (LA) project for public review and comments. Currently, the company is building the 5,000 t/a lactide / PLA and 20,000 t/a LA project at the same plant. That means its overall capacity will be boosted up to 105,000 t/a of lactide / PLA and 220,000 t/a of LA once these two projects complete construction phases.

Overview of the 100,000 t/a lactide / PLA and 200,000 t/a LA project

- Construction type: Expansion
- Location: Gucheng Subdistrict, Shouguang City, Shandong Province
- Total investment: USD225.05 million (RMB1.50 billion), USD0.30 million (RMB2.00 million) of which are for environmental protection
- Area of new workshops: 102,000 m²
- Construction period: 24 months
- Main construction content:
 - new structure: 3 workshops, one warehouse, one utility facility leveraging the existing workshop;
 - new equipment: totalling 1,068 sets of production equipment such as fermentation tank, ceramic membrane device, LA evaporator, and molecular distillation machine.
- Production capacity: 100,000 t/a lactide / PLA and 200,000 t/a LA
- Working system: 110 personnel working for three 8-hour shifts for 330 per year





Overview of the 5,000 t/a lactide / PLA and 20,000 t/a LA

- Construction type: New construction
- Location: Gucheng Subdistrict, Shouguang City, Shandong Province
- Total investment: USD86.58 million (RMB560.00 million), USD0.31 million (RMB2.00 million) of which are for environmental protection
- Floor area: 35,840 m²
- Main construction content: LA production area (including fermentation and extraction workshops), lactide and PLA workshop, and supporting equipment and facilities
- Production capacity: 5,000 t/a lactide / PLA and 20,000 t/a LA
- Construction period: 24 months (previously estimated), started in April 2021 and now still under construction
- Construction progress:
 - By May 2022, the LA workshop has set up and been in standby; the workshop work for lactide and PLA are still on the to-do list.
 - The production equipment for 5,000 t/a of PLA and 20,000 t/a of LA is designed to launch for trial production in Q2 and Q4 2022 respectively, released on 14 April, 2022, on the annual report for 2021 of China Starch Group Limited.

Golden Far East is founded in Sept. 2004 with a registered capital of USD13.85 million and owned by Shandong Shouguang Juneng Golden Corn Co., Ltd. (64.65%) and China Starch Group Limited (35.35%). Its capacity of modified starch reaches 30,000 t/a. In addition, Golden Far East and Musashino Chemical Laboratory, Ltd. incorporated JV Shouguang Juneng Musashino Biotechnology Co., Ltd. in Aug. 2020, aiming to develop a premium biomass new material project which is presently progressing well.

Huafon Group moves up bio-based and biodegradable materials business planning

Summary: In this quarter, Huafon Group Co., Ltd. has accelerated its planning in the area of bio-based and biodegradable materials, with its 600,000 t/a high-performance biodegradable new material project disclosed in April and successful acquisition of DuPont's bio-based PDO and PTT operations in early June.

On 11 April, Zhejiang Huafon Environmental Protection Material Co., Ltd. (Zhejiang Huafon), a subsidiary of Huafon Group Co., Ltd. (Huafon Group), has obtained approval in the environmental impact assessment on its 600,000 t/a high-performance biodegradable new material project.

Project at a glance:

- Construction type: New construction
- Location: Economic Development Zone of Rui'an City, Zhejiang Province
- Total investment: USD1.77 billion (RMB11.79 billion)
- Area: 459,669.86 m²
- Designed capacities of main products:
 - 300,000 t/a of polybutylene adipate-co-terephthalate (PBAT) including 120,000 t/a will be used in the production of modified products;
 - 300,000 t/a of poly propylene carbonate (PPC) including 120,000 t/a will be used in the production of modified products;
 - 300,000 t/a of biodegradable plastic film;
 - 6,300 t/a of by-product tetrahydrofuran (THF);





- 18,700 t/a of polycarbonate (PC)

Previously, Huafon Group had stated it was planning to form an integrated industrial chain of "adipic acid—PBAT—CO₂-based high molecular weight biodegradable materials and modified biodegradable plastics" during the 14th Five-year Development Plan period (2021–2025) in response to China's calling for faster development of biodegradable material sector. Huafon Group is a competent supplier of PBAT materials as the biggest adipic acid manufacturer in China. In Aug. 2021, Zhejiang Huafon's 30,000 t/a PBAT project had passed commissioning and has started production.

On 1 June, Huafon Group settled transaction deal for the DuPont's bio-based PDO (i.e. 1,3-Propanediol or 1,3-PDO) and polytrimethylene terephthalate (PTT) operations and related technologies with a sum of approx. USD240 million.

This deal contains two DuPont's production plants in the US:

- Commercial bio-based PDO plant: located in Tennessee, covers the R&D, production and sale of bio-based PDO applicable to the making of PTT materials, and owns two international brands Susterra® and Zemea®;
- PPT plant: located in North Carolina, mainly produces Susterra® products including environmental-friendly, bio-based polyester fibre PTT, and adopts production process that was developed and then applied in production in 2000 by DuPont; this product can be found in a wide range of sectors of the lower ends such as garments, carpet, auto, and packaging.

While the chemical material purified terephthalic acid (PTA) market is mature with rather stable prices, the production of PTT fibre has been under cost pressure from the upstream product PDO at persisting, exorbitant prices, where are dominated by DuPont which uses low-price and commonly-seen glucose as a substrate in fermentation to produce 1,3-PDO, shunning the risks of environmental pollutions from chemical synthesis, high costs, etc.—such production technique was introduced to a pilot-scale production in 2001 and has been put into commercial production since 2003; though at the same time, China has emphasised projects aiming to achieve breakthroughs of the 1,3-PDO production technology since 2001.

Huafon Group holds a good prospect towards the PDO's lower reaches of PPT fibre and more on the development of the green bio-based technology, saying that its reaching out to this acquisition in the midst of China's promotion of carbon reduction goals resonates with the synergy in the company, and will speed up its development of green industrial chains and technologies helping shift to a greener business.

Huitong Technology adding strength in PLA and biodegradable plastic industries

Summary: In April, Huitong Technology's 105,000 t/a biodegradable PLA plastic and the series products R&D and production project passed the local authority's checks on the environmental impact; in June, the company brought up the IPO prospectus (application draft) for USD37.85 million (RMB252.30 million) funding, looking to move further in the technology R&D of new polymer materials, biodegradable materials and CCUS (carbon capture, utilisation and storage).

On 13 April, Yangzhou Huitong Technology Co., Ltd. (Huitong Technology) received approval from the local authority for the environmental impact assessment report on its 105,000 t/a biodegradable polylactic acid (PLA) plastic and the series products R&D and





production project. The 1st phase of this project, referring to the 35,000 t/a of PLA capacity, is now under construction.

Overview of the 105,000 t/a biodegradable PLA plastic and the series products R&D and production project

- Construction type: New construction
- Location: Economic and Technological Development Zone of Yangzhou City, Jiangsu Province
- Total investment: USD267.26 million (RMB1.78 billion), USD1.94 million (RMB12.91 million) of which are for environmental protection
- Executive entity: Yangzhou Huitong Biological New Material Co., Ltd., wholly-owned by Huitong Technology
- Site & floor areas: around 13.35 ha & 168,376 m²
- Main construction content: new PLA production workshop, lactide workshop, modification workshop, and supporting equipment (rectification tower, circulating reactor, granulation units, etc.) and buildings (for production testing, etc.)
- Project objective: establish production lines with gross capacity of 105,000 t/a of biodegradable PLA plastic and the biodegradable modified plastic (i.e. biodegradable thermoplastic PBAT (polybutylene adipate-co-terephthalate)–PLA mixed fibre), equipped with self-developed lactide production technology with out-sourced lactic acid and modifier as raw materials
- Production scale:
 - Phase I: one PLA production line, 35,000 t/a (600 t/a for self-consumption); 5 biodegradable modified plastic lines, 10,000 t/a in total
 - Phase II: one PLA production line, 70,000 t/a (1,200 t/a for self-consumption); 10 biodegradable modified plastic lines, 20,000 t/a in total

On 17 June, Huitong Technology made public its application draft of IPO prospectus on the ChiNext stock market of the Shenzhen Stock Exchange (SSE). This draft prospectus intends to raise USD60.38 million (RMB402.46 million) of public funds and summaries the use of proceeds as follows:

- USD37.85 million (RMB252.30 million) to the projects that run in the company's technology R&D centre (Huitong Research Institute) and are related to new polymer materials, biodegradable materials, and CCUS (carbon capture, utilisation and storage)—areas where the current mainstream technologies concentrate—to reinforce its technological moat against the business rivals;
- USD22.53 million (RMB150.16 million) to transform and upgrade the intelligent level of its operational equipment and production lines of premium chemicals to boost the equipment manufacturing business.

Founded in 1993, Huitong Technology is committed to the equipment manufacturing, EPC (engineering, procurement and construction) project for producers of hydrogen peroxide (H₂O₂) and high polymer materials, i.e. high-performance nylon (polyamide 66 or PA 66 / nylon 66), bio-based nylon (PA56), biodegradable material (PBAT / PBS or polybutylene succinate) and polyester (PET).

In the segments of nylon 66, PBAT/PBS and H₂O₂ (fluidised bed process) engineering services, approx. 25%, 11% and 27% market shares are taken by Huitong Technology. By June 2022, it has completed and is undertaking construction of totally 300,000 t/a PBAT production capacity.

For the past three years, Huitong Technology has achieved sustainable growth in earnings:

- Revenue for 2019, 2020 and 2021: USD24.50 million (RMB168.66 million), USD27.96 million (RMB193.75 million), and USD77.11 million (RMB498.27 million);
 - 2021 revenue in biodegradable material front: USD30.86 million (RMB199.39 million), accounting to 40.26% of the total for the year;





- Net profits for 2019, 2020 and 2021: USD4.44 million (RMB30.54 million), USD4.42 million (RMB30.65 million), and USD13.88 million (RMB89.70 million).

TABLE 3: Revenue split by main service item, 2019–2021, million USD

Service item	2021		2020		2019	
	Revenue	Proportion	Revenue	Proportion	Revenue	Proportion
Biodegradable material	30.86	40.26%	5.12	18.52%	0.01	0.03%
Nylon	22.7	29.61%	0.68	2.46%	2.48	10.25%
H ₂ O ₂	10.13	13.21%	3.92	14.18%	-	-
Polyester	8.39	10.94%	14.05	50.86%	15.62	64.65%
Others	4.58	5.98%	3.86	13.98%	6.06	25.07%
Total	76.66	100.00%	27.62	100.00%	24.17	100.00%

Source: Huitong Technology



Price Update

TABLE 4: Average market prices of major raw materials of bio-based materials in China, April–June 2022

No.	Product	Price, USD/t
1	Sugarcane	134.20
2	Corn	422.60
3	Wheat	492.76
4	Bagasse	56.57
5	Corn cob	98.30
6	Wheat straw	84.44
7	Corn stover	89.69

Source:CCM

TABLE 5: Average ex-works prices of major bio-based materials in China, April–June 2022

No.	Product	Price, USD/t	Remark
1	PHA (Polyhydroxyalkanoates)	9,349	Films
2	PBS (Polybutylene succinate)	6,424	Extrusion grade and injection moulding
3	PPC (Propylene carbonate)	3,899	Injection moulding
4	PLA (Polylactic acid)	3,686	Injection moulding
5	PVA (Polyvinyl alcohol)	3,335	Flocculent
6	Starch-based material	3,372	Film moulding
7	PTT (Polytrimethylene terephthalate)	4,291	Fibre

Source:CCM



Brief News

Yuanli Chem launches BDO on European market

On 30 April, Yuanli Chemical Group Co., Ltd. (Yuanli Chem) announced online that its first batch of new product Bio-BDO (Bio-based 1,4-butanediol) was shipped out to Europe—this batch, suggesting that the company has gained international recognition, is also the first of its kind ever shipped to European market from China and even Asia.

Yuanli Chem is a high-tech firm found in 2003 and has focused on R&D, and production and sale of fine chemicals including green solvent series, dibasic alcohol series, special plasticiser series, etc., and it has managed industrial production of Bio-BDO since 2021.

Bio-based BDO is mainly produced via two pathways across the globe as follows:

- "One Step" method (also known as "Direct Fermentation"; adopted by Yuanli Chem for its Bio-BDO and most overseas producers): producing via direct fermentation of mixture of sugars, water, inorganic salt and microbes, a process transforming sugars to BDO directly;
- "Two Steps" method: producing from succinic acid which is generated from glucose during microbial fermentation

Other Chinese BDO production projects in operation or under construction include the following ones:

- The "Two Steps"-based 20,000 t/a bio-based BDO production line of Shandong Landian Biological Technology Co., Ltd. is now at construction stage and expected to enter operation by Q1 2023.
- The 10,000 t/a bio-based BDO project, proposed by Kingfa Sci. & Tech. Co., Ltd. is now at planning stage and expected to enter operation by the end of 2023.
- The 100,000 t/a bio-fermenting BDO project of Henan Xinlianxin Chemicals Group Co., Ltd. obtained registration approval from the local authority on 9 May, 2022.

Zhuhai MedPHA closes USD10.5 million+ financing

On 6 June, Zhuhai MedPHA Biotechnology Co., Ltd. (Zhuhai MedPHA) announced completion of over USD10.5 million (RMB70 million) series A funding round participated by institutions and private investors, which will be used in product innovation, production expansion, and marketing in China and overseas.

Zhuhai MedPHA was founded in March 2019 by several doctors previously resided in Austria and mainly engages in industrialisation and marketing of the self-developing fourth generation of PHA (polyhydroxyalkanoates) biomaterials and the downstream innovative products. Since its establishment, the company has applied for over 40 patents of PHA materials and been approved with 20 which facilitates the whole industrial chain from strain cultivation, fermentation and purification, to application.

Guangdong Hefeng Biotechnology Co., Ltd., a subsidiary of Zhuhai MedPHA, kicked off the operation in Zhanjiang City of Guangdong Province at the end of 2021, which is capable of producing 1,000 t/a of low-carbon PHA, and processing active molecules for downstream nutritional products and high-purity, medical-grade PHA and microparticles, with the support of the new generation of industrial biotechnology developed by the School of Life Sciences, Tsinghua University. On 16 May, Zhuhai MedPHA's PHA materials was certified





for safety tests in accordance with the Regulation (EC) No. 1935/2004 and No. 10/2011 of the European Parliament and of the Council on materials and articles intended to come into contact with food.

Prior to this series A funding round, Zhuhai MedPHA also received USD3.05 million (RMB20 million) Angel round funding from the local sector funds and private investors, as well as more than USD3.05 million (RMB20 million) support for major scientific researches and technology talents from local provincial government.

Huaheng Biotech signs diacid- and diol-oriented production project agreement

On 27 May, Anhui Huaheng Biotechnology Co., Ltd. (Huaheng Biotech) signed a cooperative agreement with Fuyu County Government over construction of a biomedicine industrial park with USD300.07 million (RMB2 billion) investment. This park is proposed to produce bio-based materials, mainly of diacid (or dibasic acid) and diol (or dibasic alcohol) from 500,000 t/a glucose supplied by Yihai Kerry's factory in the county, and cover an area of 66 ha. The estimated annual earnings from this project once operating will reach USD1.50 billion (RMB10 billion).

Huaheng Biotech is a high-tech firm with focuses on synthesis biotechnology and products involving alanine series (L-alanine, DL-alanine, β -alanine), D-calcium pantothenate, α -arbutin, etc. It has three production plants in Hefei City of Anhui Province, Qinhuangdao City of Hebei Province and Bayannur League of Inner Mongolia Autonomous Region, accounting for 36,500 t/a L-alanine, 4,000 t/a DL-alanine and 2,000 t/a β -alanine in total.

In term of technological strength, it has two technology platforms specialised in enzymatic process and fermentation. Notably, it leads the world with the success in tackling the technical difficulties in anaerobic fermentation and hence manages to produce L-alanine in a large scale. This has helped lower its energy consumption and product cost and diversify the distribution and application of its alanine products in the downstream end. Currently, its core product L-alanine takes up over 50% share in the global market, the majority of which are sold to BASF, Nouryon and other international chemical corporations as the raw materials in the production of the environmentally-friendly chelating agent MGDA.

Huaheng Biotech's 2021 revenue surged 95.81% from 2020, to USD147.64 million (RMB954 million), mostly driven by increased production and sales of valine and alanine products; its 2021 net profit after taxes also grew up 50.20% YoY to USD22.44 million (RMB145 million).

Anhui Huizhu kicks off 600,000 t/a bio-based new material project construction

On 18 April, Anhui Huizhu Bio-based New Material Co., Ltd. (Anhui Huizhu) has the environmental impact assessment (EIA) of its 600,000 t/a bio-based new material project (1st phase) publicised. Following on 29 April, it held the groundbreaking ceremony for the project in Jingxian County.





Overview of the 600,000 t/a bio-based new material project

- Construction type: New construction
- Location: Jingxian County, Xuancheng City, Anhui Province
- Site & floor areas: 53.33 ha & 180,000 m²
- Investment: USD478.76 billion (RMB3.19 billion)
- Investor: Jiangxi Zhongzu Biomass Technology Co., Ltd.
- Executive entity: Anhui Huizhu (the company was founded in Dec. 2021 with a registered capital of USD15 million or RMB100 million)
- Designed capacities: 600,000 t/a of bio-based new material in total, including 100,000 t/a in the 1st phase
- Production process: the project is designed to produce bamboo-based new materials with the bamboo abundant in Jingxian County and the neighbouring regions via green ultrasonic airflow separation technique.

This project is recognised as a project for rural revitalisation and poverty alleviation as it not only facilitates the development of new industrial chain, but also helps ease the bamboo sales pressure of the neighbouring farmers.

Qinghai Tianjinze's thermoplastic starch-based material production project revealed

Qinghai Tianjinze Biological Environmental Protection Technology Co., Ltd. (Qinghai Tianjinze)'s thermoplastic starch-based biodegradable material production line project passed the authority's environmental impact assessment with details posted on the official website of the Xining Municipal Ecology and Environment Bureau on 6 May.

Project at a glance:

- Construction nature: New construction
- Location: Chengdong District, Xining City, Qinghai Province
- Total investment: USD0.67 million (RMB4.47 million), 3.95% (=USD26,000 or RMB176,000) of which are for environmental protection
- Construction content: one production line producing 3,600 t/a of bio-enzyme degradable materials including 2,400 t/a of degradable resin, 1,000 t/a of degradable sheet, and 200 t/a of bio-enzyme modified starch

Established in 29 July, 2021 with a registered capital of USD1.50 million (RMB10 million), Qinghai Tianjinze mainly engages in the manufacturing and sales of bio-based materials, plastics, textiles and fabrics, and provides consulting services on environmental protection.

EIA report of Huaibei Chuangxin's 5,000 t/a bio-based succinic acid project accepted

The environmental impact assessment (EIA) report of Huaibei Chuangxin Biological New Materials Co., Ltd. (Huaibei Chuangxin)'s 5,000 t/a bio-based succinic acid project was accepted and publicised by the authority on 26 May.

Project at a glance:

- Construction type: New construction
- Location: Hi-Tech Industrial Development Zone of Huaibei City, Anhui Province
- Total investment: USD21.75 million (RMB144.99 million), 6.96% (=USD1.51 million or RMB10.09 million) of which are for





environmental protection

- Site & floor areas: 4 ha and 45,079.2 m²
- Main construction content: main structures (fermentation workshop, extraction workshop, refining workshop and resource recovery workshop), and supporting equipment such as storage and transport engineerings, public facilities
- Production process: adopting fermentation process with glucose and corn as raw materials
- Designed capacity: 5,000 t/a of succinic acid (main product) and 18,120 t/a of sodium sulfafate decahydrate (by product)
- Project schedule (estimated): start construction in June 2022 and initiate production operation in June 2023
- Working system: new 100 employees working in three eight-hour shifts (24-hour workday) for 330 days in a year

Founded in 17 May, 2021 with a registered capital of USD7.50 million (RMB50 million), Huaibei Chuangxin registers business covering: manufacturing and sales of bio-based materials and ecomaterials; product innovation, and polymerisation and fermentation technological development in the area of bio-based materials.

Tidetrone Biotech pushes 1 million+ t/a bio-based PBS project

In June, Beijing Tidetrone Biotechnology Co., Ltd. (Tidetrone Biotech) jointed hands with Nanjing Tech University in inaugurating an 1 million+ t/a bio-based polybutylene succinate (PBS) project designated in Guangzhou City, Guangdong Province. The project will progress over several phases and is projected to start its first mass production by the end of the year.

Biodegradable material PBS can be produced from petroleum and other natural resources (sugarcane, cassava, corn, etc.)—the former one is more commonly found in the market and the later one (known as bio-based PBS) has showed little appearance in the market for a long period of time due to high cost.

Tidetrone Biotech and Nanjing Tech University have owned self-developed biological processes for the production of succinic acid (SA) and Bio-based 1,4-butanediol (Bio-BDO), respectively. These two processes when blending together can be used to produce fully bio-based PBS in a highly green, efficient, and most importantly, economic manner, bring the production cost generated therein down to the level of that of petroleum-based PBS. This project has been drawing broad attention.

- Nanjing Tech University produces SA strains for industrial use (SA content>70 g/L) in "one anaerobic fermentation step" excluding the conventional phase of aerobic bacteria biomass cultivation, which is cost efficient; during production, microbes absorb CO₂—every 1 kg of SA produced fixes 0.37 kg of CO₂.
- Tidetrone Biotech achieves mass production of BDO through "one-step co-fermentation" method, sparing the use of chemicals in SA-to-BDO flow.

Tidetrone Biotech was founded in Jan. 2022, and announced completion of a more than USD100 million series A+ funding round in March 2022, before which it has started mass production of small molecule peptide and erythritol for consumption settings. Its self-developed biological synthesise technology of Bio-BDO will carry out to a trail production in this Q3. Zhang Zhiqian, founder of Tidetrone Biotech, estimates that in 2021, the company gain revenue of around USD15.48 million (RMB100 million) and the number may be hundreds of millions of dollars for 2022.



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