

Bio-based Material Quarterly Newsletter

Q3 2023

Issue 3 September 28, 2023



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Headline

On 14 July, China's National Development and Reform Commission released the revised Guidance Catalogue for Industrial Restructuring (2023 Version, draft for public comment), adding bio-based and bio-degradable materials content to categories.

In July and Aug., China issued the Work Plan for Steady Growth of Light Industry and the Work Plan for Steady Growth of Petrochemical and Chemical Industries for 2023–2024, encompassing measures for growing the bio-based materials industry.

Two major new material producers Hisun Biomaterials and Kingfa reported improved revenues but squeezed profits in H1 2023.

On 7 Aug., Cathay Biotech launched its semi-annual report for H1 2023 with net profit down by 28.12%, and it was putting off startup of the 500,000 t/a bio-based pentamethylene diamine (PDA) and 900,000 t/a bio-based polyamide (PA) project.

In Q3, Pliith Biotechnology's 50,000 t/a polylactic acid (PLA) production project started up, Dehong Tech proposed a 100,000 t/a PLA project, COFCO Biotech's subsidiary's 30,000 t/a lactide project was approved, and East China Engineering Science and Technology celebrated technological breakthrough in lactide production.

Jindan Technology revealed revenue and net profit reductions of 10.65% and 40.72% in H1 2023 respectively, and is gearing up to accelerate its "lactic acid–lactide–PLA" industrial integration in Q3.

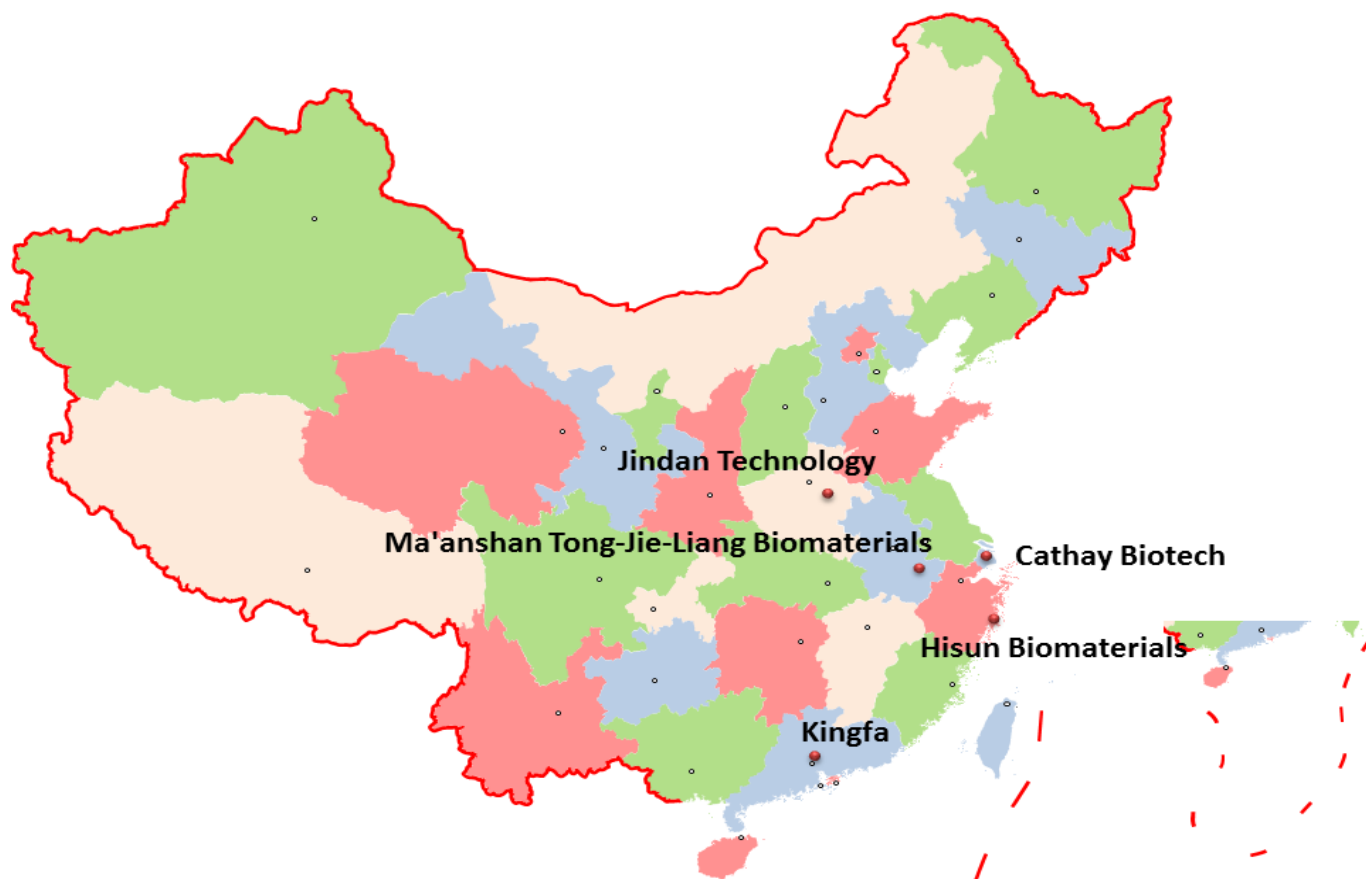
In Q3, Ma'anshan Tong-Jie-Liang Biomaterials' 300,000 t/a lactic acid (LA), 200,000 t/a polylactic acid (PLA) and 100,000 t/a PLA fibre production line project (phase I) was approved for construction, and its 10,000 t/a bio-based new material PLA (reconstruction) project was first unveiled.

On 3 July, the environmental impact assessment (EIA) report of Xinjiang Dongyu's 100,000 t/a high-purity L-lactic acid and 50,000 t/a L-polylactic acid project was accepted.

On 11 July, the detailed report on Tianjin Nine Dragons' completed first-phase technological transformation of the 320,000 t/a bio-based chemical fibre project was disclosed; the product is to replace waste paper as raw material of paper products.

Nantong Sateri put the 1st phase of the 200,000 t/a solvent-spun cellulose fibre project into operation on 17 Aug.







Editor's Note

Welcome to the Bio-based Material Quarterly Newsletter Q3 2023.

Policy

In this quarter, China released documents adding provisions related bio-based/biodegradable materials, namely, the *Guidance Catalogue for Industrial Restructuring (2023 Version, draft for public comment)*, the *Work Plan for Steady Growth of Light Industry for 2023–2024* and the *Work Plan for Steady Growth of Petrochemical and Chemical Industries for 2023–2024*.

Market dynamics & company performance

Hisun Biomaterials, Kingfa, Cathay Biotech and Jindan Technology all reported dwindling net profits in H1 2023. Cathay Biotech notified that it was putting off startup of the 500,000 t/a bio-based pentamethylene diamine (PDA) and 900,000 t/a bio-based polyamide (PA) project.

In the polylactic acid (PLA) manufacturing, Pliith Biotechnology's 50,000 t/a PLA production project came on stream; Dehong Tech, Ma'anshan Tong-Jie-Liang Biomaterials and Xinjiang Dongyu saw their PLA production project making progresses; New Tuoyang Bio partnered with HighChem for high-end PLA development; COFCO Biotech had the 30,000 t/a lactide project approved; and East China Engineering Science and Technology proclaimed breakthrough in producing lactide.

More are included: Tianjin Nine Dragons completed the 1st-phase bio-based chemical fibre capacity reconstruction whose production is to replace the existing waste paper capacity; Nantong Sateri's 1st-phase construction of the 200,000 t/a solvent-spun cellulose fibre project entered operation; Tsinghua Smart signed agreement to build 20,000 t/a 1,3-propanediol (PDO) project in Guangxi; HANVO Safety proposed a 110,000 t/a biodegradable polyester rubber project; Germany-based Carbonauten raised plan to set carbon-negative materials plant and China headquarters in Chibi, Hubei; Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences (NIMTE) declared success in pilot-scale production of 2,5-furandicarboxylic acid (FDCA); Zhuhai Kingfa and Suzhou Juwei Yuanchuang entered partnership to industrialise straw-derived succinic acid (SA); and Sanshu Bio closed pre-Series A funding round of tens of millions RMB for plant-based new materials development.

Price

In the period of Q3, PLA prices were on a slow decline, while the PHA prices have remained flat.

The USD/CNY exchange rate in this newsletter is USD1.00=CNY7.1788 on 1 Sept., 2023, 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 to revise guidelines for industrial restructuring adding bio-based materials to categories

Summary: On 14 July, China's National Development and Reform Commission released the revised *Guidance Catalogue for Industrial Restructuring (2023 Version, draft for public comment)*, adding bio-based and bio-degradable materials content to categories.

On 14 July, China's National Development and Reform Commission released the revised *Guidance Catalogue for Industrial Restructuring (2023 Version, draft for public comment)*. Compared with the currently effective *Guidance Catalogue for Industrial Restructuring (2019 Version)*, this draft adds bio-based and bio-degradable materials content to the listing of agriculture, forestry, animal husbandry and fishery, petrochemicals, textile, and light industry, etc.; non-grain biomass is added to the listing of biomaterials, low-carbon environmental technology, agricultural packaging materials, lightweight materials applications in automobile under the "encouraged category".

Related changes are extracted as follows:

The Encouraged Category

- Agriculture, forestry, animal husbandry and fishery:
 - Green agriculture: Demonstration and application of fully biodegradable agricultural film and high strength easy-to-recycle agricultural film in farmlands
 - Comprehensive use of renewable resources: Comprehensive utilisation of crop straw (from straw collection, to storage and transportation system construction, and to turning straw into fertilisers, feeds, energy sources, base ingredients and raw materials utilisation), comprehensive utilisation projects of rural renewable resources
- Petrochemicals:
 - Resin: Development and production of degradable polymers, and of new types of polyamides such as long-carbon-chain nylon, heat-resistant nylon, etc.
 - Biomaterial: Development and production of polymer materials, reagents, chips, interferons, sensors, cellulose-based biochemical products made with non-grain biomass as raw material
 - Low-carbon environmental technology: Development and application of new technologies for the efficient use of carbon dioxide (including carbon dioxide-methane reforming, carbon dioxide hydrogenation of chemicals, polycarbonates and carbon dioxide-based biodegradable polymer plastics)
- Automobile:
 - Lightweight materials application: Ultra-high-strength steels, high-strength low-density steels, ADI cast iron, high-strength aluminium alloys, magnesium alloys, powder metallurgy materials, high-strength composite plastics, composite fibres and bio-based compounds
- Light industry:
 - Development, production and application of biodegradable plastics and its series of products, agricultural plastic water-saving equipment, development and production of long-life functional agricultural film (three years and above), all biodegradable seedling pots and plates, and related agricultural packaging materials
- Textile:
 - Copolymerisation modification of differentiated, functional polyethylene terephthalate/PET (cationic dyeable polyester/CDP or enhanced CDP/ECDP, alkali-soluble PET/COPET, high-shrinkage PET/HSPET, and polyester produced with green catalysts); and development and production of novel polyesters and fibres, such as polytrimethylene terephthalate/PTT, polyethylene naphthalate/PEN, polybutylene terephthalate/PBT, poly(1,4-cyclohexylene dimethylene terephthalate)/PCT
 - Application of green and eco-friendly techniques and equipment to develop and produce bio-based fibres (including polybutylene succinate/PBS, polybutylene adipate-co-terephthalate/PBAT, polycaprolactone/PCL, poly(3-





hydroxyalkanoate)/PHA, polylactic acid fibre/PLA), Lyocell short fibre (of capacity of single production line above 50,000 t/a), Lyocell filament yarn, and bio-based fibre materials (including regenerative cellulose fibres derived from bamboo and flax, alginate fibre, chitosan fibre, plant and animal protein-based fibres, bio-based polyamides and polyesters)

The Restricted Category

- Grain-to-ethanol and edible plant oil seed-to-biofuel projects that are not conforming to national plans and industrial policies

The Obsolete Category

- Production of ultra-thin plastic bags with a thickness of less than 0.025 mm; outdated products including disposable foamed plastic tableware, disposable plastic cotton swab; daily necessities containing plastic microbeads; and polyethylene film for agricultural use with a thickness of less than 0.01 mm.

China calls for stable development of light industry, petrochemical and chemical industries in 2023–2024

Summary: In July and Aug., China issued the *Work Plan for Steady Growth of Light Industry* and the *Work Plan for Steady Growth of Petrochemical and Chemical Industries for 2023–2024*, encompassing measures for growing the bio-based materials industry.

On 19 July and 24 Aug., China issued respectively the *Work Plan for Steady Growth of Light Industry* and the *Work Plan for Steady Growth of Petrochemical and Chemical Industries for 2023–2024*, encompassing industrial targets and measures for growing the bio-based material industries (detailed below).

Work Plan for Steady Growth of Light Industry for 2023–2024

General target: Light industry's growth rate averages at 4% in 2023–2024, with a total revenue of enterprises above designated size exceeding USD3.48 trillion (RMB25 trillion).

Measures for the bio-based/biodegradable materials industries:

- Plastic products: Promote production and application of water-saving plastic devices, long-life functional agricultural film, thermal insulation board, special pipe, plastic door and window profiles; double efforts to meet targets on the supply of thickened high-intensity agricultural film and fully biodegradable agricultural film to ensure the sufficiency of high-quality agricultural film
- Papermaking: Fortify forest–paper integration engineering that applies bamboo pulp, sugarcane bagasse, straw and other non-wood materials to diversify and expand domestic raw material supply
- Bio-manufacturing: Accelerate non-grain biomass application and exploration of agricultural and forestry wastes as raw material (straw, etc.); enhance the saccharification technological level to process non-grain biomass at lower cost, to achieve sustainable development in bio-manufacturing; support eligible regions to apply for bio-based material and non-grain biomass energy application pilot areas; strengthen the development of innovative plant-based materials and ramp up production of related to bioactive materials and the application in food, cosmetics and other areas

Work Plan for Steady Growth of Petrochemical and Chemical Industries for 2023–2024

General target: The petrochemical and chemical industries' growth rate averages at 5% in 2023–2024, with the industrial revenue (excluding oil and gas) exceeding USD2.09 trillion (RMB15 trillion) by 2024.

Measures for the non-grain bio-based material and biomedicine areas

- Promote demonstration projects using non-grain biomass as feedstocks in the production of bio-based materials and organic fertilisers





- Encourage local governments to make good use of the regional resources, technologies and industrial strength and concentrate small and medium-sized enterprises (SMEs) in specialty industrial clusters related to novel chemicals, non-grain bio-based materials and such
- Continue to implement rebuilding of industrial foundation, including construction of industrial chains in key areas such as aerospace, electronic information, new energy, energy conservation and environmental protection, hydrogen energy and healthcare, industrialisation of speciality chemicals such as catalysts, speciality polyesters, membrane materials, novel chemical materials and key monomer materials, and selection of the eligible candidates to undertake biomedical material innovation projects to enhance high-end product supply capacity; deepen upstream-downstream cooperation in the fields of integrated circuit materials and biomedical materials, promote the application demonstration projects of key chemical materials across the full supply chain, and make use of the compensation mechanism for the first batch of innovative materials to accelerate the promotion, application and iteration of new chemical materials.





Market Analysis

H1 2023 Financial reports of Hisun Biomaterials and Kingfa

Summary: Two major new material producers Hisun Biomaterials and Kingfa reported improved revenues but squeezed profits in H1 2023.

In Aug., Zhejiang Hisun Biomaterials Co., Ltd. (Hisun Biomaterials, Stock code: 688203.SH) and Kingfa Sci. & Tech. Co., Ltd. (Kingfa, Stock code: 600143.SH) released their earning results in H1 2023, both implying being affected by the slow-growing consumption market.

Hisun Biomaterials in H1 2023 (with results disclosed on 14 Aug.):

Financial data:

- Revenue: USD46.46 million (RMB333.56 million), up 10.23% YoY
- Net profit attributable to the parent company: USD2.75 million (RMB19.75 million), down 7.55% YoY
- Net profit after excl. extraordinary gains/losses: USD2.46 million (RMB17.63 million), down 7.38% YoY

Production and sales:

- Sales volume of polylactic acid (PLA) resins hit 17,700 tonnes, up 23% YoY.
- Production of pure PLA resin was up 35.75% YoY and that of modified PLA resin compounds down 32.09% YoY.
- Hisun Biomaterials' subsidiary Zhejiang Honor Biomaterials Co., Ltd. completed trial run of the 2nd phase (20,000 t/a PLA production line) of the 50,000 t/a PLA resin and the related products project, and has put it into operation in the reporting period.
- Hisun Biomaterials' subsidiary Zhejiang Haichuangda Biomaterials Co., Ltd. announced completion of some building structures of the 150,000 t/a PLA funding project, the rest construction work of which is still in progress.

Operation summary:

- The growth of revenue, was the result of increasing sales at home market, as Hisun Biomaterials pointed out in the report;
- While its net profit was under the combined influence of fierce competition in the PLA industry, sluggish consumption demand and lower-than-expected implementation of the "plastic ban and restriction" policies, the company said its price adjustment to earn market share also impaired its profitability and earnings results in H1.

Kingfa in H1 2023 (with results disclosed on 28 Aug.):

Financial data:

- Revenue: USD2.83 billion (RMB20.35 billion), up 4.53% YoY
- Net profit attributable to the parent company: USD65.34 million (RMB469.07 million), down 41.53% YoY
- Net profit after excl. extraordinary gains/losses: USD49.27 million (RMB353.68 million), down 49.64% YoY

Production and sales:

- Sales volume of finished new material products reached 77,000 tonnes, up 23.44% YoY, 63,000 tonnes of which were fully biodegradable plastics, up 27.53% YoY.
- By the end of H1 2023, Kingfa has formed 180,000 t/a of capacity for PBAT (polybutylene adipate-co-terephthalate)/PBS (polybutylene succinate), and 30,000 t/a for PLA resins.
- Its 10,000 t/a bio-based 1,4-butanediol (BDO) project is progressing steadily under construction, a part of Kingfa's technological R&D and industrial construction plan of bio-based monomers and bio-based materials.

Operation summary:

- Kingfa credited China's position as the largest producer and consumer of new chemical materials in the world and China's prospective new material industry currently at its key development stage prioritising industrial structure optimisation and industry





upgrading, to its continuously rising revenue. The rapid development of strategic emerging industries such as new energy vehicles, photovoltaics, energy conservation, new infrastructure, 5G communications, artificial intelligence and VR/AR, have showed Kingfa new opportunities for sustainable, high-quality growth.

- Explanation for the slashed profit was made that the new chemical material industry has been living under the shadow of the complicate international economic environment encountering runaway inflation, geopolitics, as well as domestic economic challenges. These factors imposed great pressure on the company's operations.

TABLE 1: Kingfa's H1 2023 revenue by product category, million USD

Product category	Revenue	YoY change	Operating costs	YoY change
Modified plastics	1,623.15	-4.26%	1,231.86	-9.17%
New materials	198.83	-11.95%	164.01	-9.27%
Green petrochemical products	550.55	159.20%	591.62	154.61%
Medical and healthcare products	34.61	-75.37%	29.63	-66.77%
Trade goods	399.04	0.51%	395.26	1.96%

Note:1. Modified plastic products include original modified plastics and environmentally-friendly high-performance recycled plastics;

2. New material products include fully biodegradable plastics, specialty engineering plastics, carbon fibre and composite materials;

3. Green petrochemical products include propylene, isooctane, methyl ethyl ketone, liquefied gas and ABS resin.

Source:Kingfa

Cathay Biotech's net profit shrinks 28% in H1 2023

Summary: On 7 Aug., Cathay Biotech launched its semi-annual report for H1 2023 with net profit down by 28.12%, and it was putting off startup of the 500,000 t/a bio-based pentamethylene diamine (PDA) and 900,000 t/a bio-based polyamide (PA) project.

On 7 Aug., Cathay Biotech Inc. (Cathay Biotech, stock code: 68806.SH) released its semi-annual report for H1 2023 with both revenue and net profit down by over 20% YoY; and it was putting off operation startup of the 500,000 t/a bio-based pentamethylene diamine (PDA) and 900,000 t/a bio-based polyamide (PA) project to the end of 2024.

Cathay Biotech's financial performance in H1 2023:

- Revenue: USD143.53 million (RMB1.03 billion), down 20.05% YoY
- Net profit attributable to equity shareholders of the listed company: USD33.69 million (RMB241.86 million), down 28.12% YoY
- Net profit after excl. extraordinary gains/losses: USD28.30 million (RMB203.16 million), down 39.46% YoY
- Depressed downstream demand that plunged the sales of long-chain dibasic acids (LCDAs) and rising non-recurring costs were the two main contributors to such figure declines, according to Cathay Biotech's statement.
- LCDAs is one of the main businesses of Cathay Biotech. In H1, LCDAs purchasing contracts brought in revenue of USD130.85 million (RMB939.32 million), down 13.03% YoY, equivalent to 91.16% of the company's total revenue.
- Bio-based PA series products raked in USD9.72 million (RMB69.76 million) in sales, accounting for 6.77% of the company's total revenue.



**Cathay Biotech's current production capacity:**

- Bio-based LCDAs series (115,000 t/a), built in Jinxiang County of Shandong Province's Jining City, Wusu City of Xinjiang Uygur Autonomous Region, Taiyuan City of Shanxi Province
- Bio-based PA series (100,000 t/a for Tyron, E-2260, E-1273, E-300, E-6300, etc.), built in Wusu City of Xinjiang Uygur Autonomous Region
- Bio-based sebacic acid (40,000 t/a), built in Taiyuan City of Shanxi Province, still in trial operation
- Bio-based PDA (50,000 t/a), built in Wusu City of Xinjiang Uygur Autonomous Region, production mainly as the input of the bio-based PA production and little for sale

Funding projects on hold

On the same report announcement day, Cathay Biotech said it was postponing the startup of one of its funding projects—the 500,000 t/a bio-based PDA and 900,000 t/a bio-based PA project—to 31 Dec., 2024, one year behind the original schedule. Previously on 10 Jan., 2023, the company delayed the 20,000 t/a long-chain polyamide operation start by 6 months to Dec. 2023; this project's engineering reached 15.43% in progress as of June 2023.

According to Cathay Biotech, the two projects abovementioned are currently under construction, but the construction progresses fell short, being confronted with changes in staffing, arrival of purchased equipment, building construction and equipment installation speeds, macro-environment, trading and industrial policies.

Maximum RMB6.6 billion funding injecting working capital

On 26 June, 2023, Cathay Biotech proposed to raise no more than USD919.37 million (RMB6.6 billion) of funding via private placement of A-shares, to replenish working capital and repay debts. According to the proposal, the accredited investor is the to-be-established partnership company Shanghai Yaoqin Biotechnology Partnership (L.P.) (hereinafter referred to as Shanghai Yaoqin, a tentative name). Shanghai Yaoqin will be owned by the stated-owned conglomerate China Merchants Group/CMG (49%) and Cathay Industrial Biotech Ltd/CIB (51%), and operate in the field of equity investment.

By June 2023, XIUCAI LIU, XIAOWEN MA and CHARLIE CHI LIU are the actual controllers of Cathay Biotech, holding 28.32% equity share of the company collectively with their ownership of CIB. Once this private placement completes, Cathay Biotech's controlling shareholder will change from CIB to Shanghai Yaoqin, while XIUCAI LIU, XIAOWEN MA and CHARLIE CHI LIU will retain to be the actual controllers, and CMG is expected to acquire over 5% share of Cathay Biotech via its holding of Shanghai Yaoqin.

Cathay Biotech and CMG are also tied up in a business cooperation agreement, which requires CMG to purchase at least 10,000 tonnes, 80,000 tonnes and 200,000 tonnes of Cathay Biotech's bio-based PA resin in 2023, 2024 and 2025 respectively. Follow-on procurements with terms concerning product type and purchase quantity should be planned out a year in advance since the end of 2024.

Updates of China's lactide, PLA projects in Q3

Summary: In Q3, Pliith Biotechnology's 50,000 t/a polylactic acid (PLA) production project started up, Dehong Tech proposed a 100,000 t/a PLA project, COFCO Biotech's subsidiary's 30,000 t/a lactide project was approved, and East China Engineering Science and





Technology celebrated technological breakthrough in lactide production.

In Q3, China market saw new updates on two polylactic acid (PLA) related projects and two lactide related projects, as summarised below:

Pliith Biotechnology Co., Ltd. (Pliith Biotechnology)

On 30 June, Pliith Biotechnology put its newly-built 50,000 t/a PLA production facility into operation, which also produces 75,000 t/a of lactic acid (LA), the supporting product. This 50,000 t/a PLA capacity is a part of the company's 350,000 t/a PLA project, which is designed to take up an area of 120 ha and a total investment of USD1.20 billion (RMB8.6 billion) according to the two-phased construction plan:

- Phase I: USD278.60 million (RMB2.0 billion) in building 50,000 t/a PLA capacity and 75,000 t/a LA capacity in an area of 20 ha
- Phase II: USD919.37 million (RMB6.6 billion) in building 300,000 t/a PLA capacity in an area of 100 ha

Pliith Biotechnology was set up in May 2021 with a registered capital of RMB360 million. In early June this year, Orinko Advanced Plastics Co., Ltd. (Orinko, stock code: 688219.SH) transferred all of its holding of 33.8889% equity share of Pliith Biotechnology to Eighth Element Environment Technology Co., Ltd (OTIMES).

Hangzhou Dehong Technology Co., Ltd. (Dehong Tech)

On 13 July, Dehong Tech signed an investment contract with the local Government of Juye County, Heze City, Shandong Province, to start a 100,000 t/a PLA and 200,000 t/a LA project. The proposed project is to build a green, low-carbon and integrated technology industrial base in an area of 13.33 ha with USD278.60 million (RMB2.0 billion), installed with 10 LA extraction production lines, 10 PLA production lines, finished product workshops, R&D centre, etc.

Established in Dec. 2017, Dehong Tech now possesses the third-generation LA technology originated from Germany, which enables fermentation and extraction of LA from wheat straw, sugarcane bagasse and other agri-wastes. Compared with the mainstream LA preparation technology in the industry that uses corn, starch and other grain-based materials as inputs, Dehong Tech's process costs much less. Because it adopts the "two-step" approach (microwave heating and conventional heating in the ring-opening polymerisation (ROP) of lactide) supported with self-developed installations like innovative continuous polymerisation reactor.

COFCO Biomaterial (Yushu) Co., Ltd. (COFCO Biomaterial (Yushu))

On 28 July, COFCO Biomaterial (Yushu), subsidiary of COFCO Biotechnology Co., Ltd. (COFCO Biotech), received approval on the environmental impact report of its new 30,000 t/a lactide project by the Jilin Municipal Ecology and Environment Bureau.

Project overview:

- Construction nature: New construction
- Location: Wukeshu Economic and Technological Development Zone, Yushu City (county-level), Changchun City (prefecture-level), Jilin Province
- Total investment: USD81.76 million (RMB586.94 million)
- Site area: 42,657.87 m²





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

Later on 12 Sept., COFCO Biotech updated that its 30,000 t/a PLA modified materials and products production facility has been in stable operation, and expected that this 30,000 t/a lactide project would complete roof sealing by the end of Oct. this year and complete installation of main equipment by the end of this year. These gradually progressing projects can fuel up COFCO Biotech's layout throughout the industrial chain from LA, to lactide and degradable PLA materials, and its plan to capture more market share.

East China Engineering Science and Technology Co., Ltd. (ECEC, stock code: 002140.SZ)

According to ECEC's semi-annual report for H1 2023 released on 31 Aug., the company was gearing up to expand in the field of degradable materials by developing the PLA production technologies. It underscored in the report that it had overcome the technical hurdle in producing lactide, an intermediate product of PLA, adding that its PLA technological development project had gathered sufficient data for 50,000 t/a production from rounds of pilot-scale experiment and process parameter optimisation.

ECEC is a scale state-owned corporation focusing on engineering of chemical facilities and environmental and governance infrastructure, operation of environmental infrastructure, and production of high-end chemicals (PBAT/PBS/PBT). It reported significant earnings growth in H1 2023: revenue up 73.60% YoY to USD487.13 million (RMB3.50 billion) and net profit attributable to parent company up 23.63% YoY to USD28.29 million (RMB203.10 million).





Company Dynamics

Jindan Technology quickening "lactic acid-lactide-PLA" industrial integration

Summary: Jindan Technology revealed revenue and net profit reductions of 10.65% and 40.72% in H1 2023 respectively, and is gearing up to accelerate its "lactic acid–lactide–PLA" industrial integration in Q3.

As a leader of the China's lactic acid (LA) industry, Henan Jindan Lactic Acid Technology Co., Ltd. (Jindan Technology, Stock Code: 300829.SZ) boasts capacities for LA and the derivatives (183,000 t/a in total), with its operations in R&D, production and sale. To strengthen its position in the industry, Jindan Technology has been shoring up its R&D and production capability for LA and lactate salts, and expanding operations upward to corn growing and downward to the fields of lactide, polylactic acid (PLA) and other biodegradable materials.

On 28 Aug., Jindan Technology released its semi-annual report for H1 2023, showing year-on-year declines in both revenue and net profit, affected by macro-economic environment.

Key financials in H1 2023:

- Revenue: USD100.41 million (RMB720.80 million), down 10.65% YoY
- Net profit attributable to the parent company: USD7.28 million (RMB52.25 million), down 40.72% YoY
- Net profit after excl. extraordinary gains/losses: USD5.83 million (RMB41.85 million), down 52.58% YoY

Multifaceted factors were cited in the report, including the aggravating Sino-US trade war, ongoing Russia-Ukraine conflict, social and governance challenges in the Europe, as well as China's economic slowdown with increased downward pressure, depressed consumption demand, lower expectation on supply, reduced resident income and spending power. But Jindan Technology also underscored that it would continue to promote biodegradable material projects and speed up "LA–lactide–PLA" industrial integration in the following period.

Highlighted construction projects of biodegradable materials and the related products in H1 2023:

- 150,000 t/a PLA Biodegradable New Material Project: The 1st phase (75,000 t/a) has progressed as scheduled with public funding in place
- 10,000 t/a Lactide Project: The installed production equipment is running steadily and product quality indices are at controllable levels. However, currently, government guidance is still a crucial part to the development of the degradable market in its early stage where downstream manufacturers operate at low rates. So the company indicated that it would ramp up production level based on the market status.
- 60,000 t/a Biodegradable Polyester (PBAT) and Related Products Project: Construction work was completed and is ready for trial production as scheduled.

Latest activities

In July 2023, Jindan Technology completed issue of 7 million convertible bonds worth of USD97.51 million (RMB700 million). The proceeds from this issuance will be used in the 75,000 t/a PLA project and to supplement working capital for production diversification and operation expansion. This PLA project, subjected to a 24-month construction period, will adopt the "LA–lactide–PLA" production pathway





under the executor Jindan Biological New Materials Co., Ltd., subsidiary of Jindan Technology. At present, Jindan New Biomaterials has possessed the core technology and capacity to operate the front-end manufacturing of PLA which includes steps of "LA to lactide". These planning PLA and lactide capacities, once become fully operational, could give Jindan Technology a leg up in cost and scale competitiveness, and drive up its profit as a result.

On 12 July, Jindan Technology and the Department of Chemical Engineering, Tsinghua University signed cooperation agreement on development of a technical service project for high-throughput mutagenesis and selection of high-yielding *Bacillus coagulans* strains, and strain intellectual property right protection. This cooperative project focuses on building a high-efficacy lactic acid bacteria strain breeding and sifting platform that will facilitate selection of high L-lactic acid productivity strains. The selected ones will be used to scale production and help bring Jindan Technology to be at the world's leading edge of lactic acid bacteria fermentation technological development.

Ma'anshan Tong-Jie-Liang Biomaterials' PLA project updates

Summary: In Q3, Ma'anshan Tong-Jie-Liang Biomaterials' 300,000 t/a lactic acid (LA), 200,000 t/a polylactic acid (PLA) and 100,000 t/a PLA fibre production line project (phase I) was approved for construction, and its 10,000 t/a bio-based new material PLA (reconstruction) project was first unveiled.

In Q3, two polylactic acid-related projects of Ma'anshan Tong-Jie-Liang Biomaterials Co., Ltd. (Ma'anshan Tong-Jie-Liang Biomaterials) were made public with details. Ma'anshan Tong-Jie-Liang Biomaterials was founded in Jan. 2010, specialised in R&D, production and sale of PLA and the related products.

1. The 300,000 t/a lactic acid (LA), 200,000 t/a polylactic acid (PLA) and 100,000 t/a PLA fibre production line project (phase I)

This project was first publicised on 10 July and was approved on the environmental impact assessment (EIA) report by the Haiyang Branch of the Ecology and Environment Bureau of Yantai City, Shandong Province on 8 Aug. Shandong Tongbang New Materials Technology Co., Ltd. (Shandong Tongbang), a wholly-owned subsidiary founded by Ma'anshan Tong-Jie-Liang Biomaterials with a registered capital of RMB600 million, will undertake the project construction and operation.

Project details:

- Construction nature: New construction
- Total investment: USD360.26 million (RMB2.59 billion), 4.34% (=USD15.67 million/RMB112.50 million) of which for environmental protection
- Location: Haiyang City (county level), Yantai City (prefecture level), Shandong Province
- Site & floor areas: 228,643.06 m² & 170,637.81 m²
- Construction content:
 - A production zone, including workshops for glucose dissolution, fermentation, extraction, decolorisation, refining, waste bacterial residue drying, bottom product treatment, lactide generation, purification, polymerisation, PLA recycling, spinning, fibre post-treatment
 - Ancillary works, including power centre, circular water station, strain and testing lab, storage room, wastewater treatment station, hazardous waste temporary storage room, etc.
- Designed capacity (in phase I): 150,000 t/a LA, 100,000 t/a PLA, and 50,000 t/a PLA fibre
- Working system: 297 people working in four 8-hour shifts and three running systems, for 8,000 hours or 333 days per year
- Progress plan: The phase I of the project is divided into two stages: the 1st stage is subjected to a 5-month construction period



ending in Dec. 2023, and the 2nd stage is subjected to a 18-month construction period ending in June 2025.

- Production process:
 - LA production is to use glucose fermentation and ion exchange, etc.
 - PLA production is to adopt the "two-step" approach (microwave heating and conventional heating in the ring-opening polymerisation of lactide)".

TABLE 2: Shandong Tongbang's production plan

Item	Designed capacity, t/a	Note
Lactic acid (LA)	150,000	To be used in the PLA production
Polylactic acid (PLA)	100,000	50,000 t/a to be used in the PLA production and 50,000 t/a for sale
PLA Fibre	50,000	For sale
Low-gloss pure LA	14,900	/
Gypsum	201,000	/

Source: EIA report of Shandong Tongbang's 300,000 t/a of LA, 200,000 t/a PLA and 100,000 t/a PLA fibre project (phase I)

2. The 10,000 t/a bio-based new material PLA project

This project's EIA report was publicised on 25 Aug. In March 2013, Ma'anshan Tong-Jie-Liang Biomaterials started up its first production line of bio-based new material PLA with 10,000 t/a capacity. In Sept. 2021, it announced a successful trial run of its construction of the world's first exclusive production line of PLA short fibre (compound fibre) with 10,000 t/a capacity.

Project details:

- Construction nature: Reconstruction
- Total investment: USD16.72 million (RMB120 million), 10% (=USD174,100/RMB1.25 million) of which for environmental protection
- Location: Economic and Technological Development Zone of Ma'anshan City, Anhui Province
- Construction content:
 - Add new systems for depolymerisation, distillation, crystallisation, polymerisation, devolatilisation;
 - Upgrade the "one-step" process (direct polycondensation of lactic acid) into "two-step" approach (microwave heating and conventional heating in the ring-opening polymerization (ROP) of lactide);
 - Redeploy the existing 10,000 t/a PLA capacity—physically modifying thereinto 5,000 t/a production of PLA products
- Working system: 56 in-service employees in three 8-hour shifts for 320 days per year
- Construction period: Sept. 2023–Feb. 2024

TABLE 3: Ma'anshan Tong-Jie-Liang Biomaterials' reconstruction project production plan

Product type	Item	Designed capacity, t/a	
		Before reconstruction	After reconstruction
Main product	Polylactic acid (PLA)	10,000	5,000
	Modified PLA	/	5,000
By product	Crude lactic acid (LA)	4,470	5,013

Source: EIA report of Ma'anshan Tong-Jie-Liang Biomaterials' 10,000 t/a bio-based new material PLA project

Xinjiang Dongyu's 100,000 t/a high-purity L-lactic acid, 50,000 t/a L-PLA project accepted

Summary: On 3 July, the environmental impact assessment (EIA) report of Xinjiang Dongyu's 100,000 t/a high-purity L-lactic acid and 50,000 t/a L-polylactic acid project was accepted.

On 3 July, the environmental impact assessment (EIA) report of the 100,000 t/a high-purity L-lactic acid and 50,000 t/a L-polylactic acid (PLA) project of Xinjiang Dongyu Lvsu Biotechnology Co., Ltd. (Xinjiang Dongyu) was accepted and made public by the Ecology and Environment Bureau of the Xinjiang Production and Construction Corps.

Project overview:

- Construction nature: New construction
- Total investment: USD143.76 million (RMB1.03 billion), 1.84% (=USD2.65 million/RMB19.00 million) of which for environmental protection
- Location: Huyanghe Economic and Technological Development Zone, Xinjiang Uygur Autonomous Region
- Site & floor areas: 400,200 m² & 218,100 m²
- Main construction items: Workshops for fermentation, extraction, refining, PLA production, PLA moulding, and organic fertilisers, and storage rooms and supporting facilities
- Project features:
 - This project will adopt the "two-step" process (lactic acid (LA)–lactide–PLA), which is to generate L-lactic acid from liquid sucrose fermentation and use it to synthesise degradable PLA materials that can be made into fine chemicals and novel materials; meanwhile, this process can recycle mycelium and bacterial protein wastes for the production of bio-organic fertilisers, reflecting its compliance with clean production and circular economy requirements.
 - The LA production line will introduce high-efficiency processing equipment for bacterial residue filtration, continuous acidolysis, continuous decolorisation and reclamation, continuous ion-exchange, continuous nanofiltration (NF), continuous molecular distillation, in an aim to reduce energy consumption and waste discharge and to increase LA product yield and quality.
 - The PLA production line will start with high L-lactic acid productivity strain fermentation and be equipped with domestically-made or imported advanced extraction and refining equipment; once in full operation, it could produce 50,000 t/a L-PLA, 100,000 t/a high-purity L-PLA, and 700,000 t/a fertiliser compounds.
- Working system: 433 employees in 3 shifts, for 330 days or 7,920 hours per year



Xinjiang Dongyu was set up in June 2022 by Jiangsu Dongyu Lvsu Biotechnology Co., Ltd. with a registered capital of RMB100 million. It focuses on the R&D, manufacturing and sale of bio-based materials, the R&D of biological feeds and bio-organic fertilisers.

TABLE 4: Xinjiang Dongyu's project production plan

Product type	Item	Capacity, t/a	Note
Main product	High-purity L-lactic acid	100,000	To be used in the PLA production
	Poly (L-lactide) (PLLA) particles	50,000	/
	L-Lactic acid solution	11,694	/
By product	Liquid bio-organic fertilisers	588,100	/
	Solid bio-organic fertilisers	46,700	/

Source: EIA report of Xinjiang Dongyu's high-purity L-lactic acid and L-PLA project

Nine Dragons Paper completes 1st-phase bio-based chemical fibre capacity reconstruction

Summary: On 11 July, the detailed report on Tianjin Nine Dragons' completed first-phase technological transformation of the 320,000 t/a bio-based chemical fibre project was disclosed; the product is to replace waste paper as raw material of paper products.

On 11 July, Nine Dragons Paper (Tianjin) Co., Ltd. (Tianjin Nine Dragons)'s completed first-phase technological transformation of the 320,000 t/a bio-based chemical fibre project was publicised with environmental monitoring and approval report.

Here are the project details:

Project background

Tianjin Nine Dragons was founded in Nov. 2007 by Nine Dragons Paper (Holdings) Limited (Nine Dragons Paper, stock code: 02689.HK). It produces high-performance kraft card board, corrugated sheet products, painting and writing paper, and other paper products. The company is currently producing products with US-sourced waste paper and out-sourced unbleached wood pulp paper as raw materials.

There has been an increasing shortfall in raw material supply since 2020 when China started to ban all imports of solid waste in accordance with the *Law on the Prevention and Control of Environmental Pollution by Solid Wastes* and the *Notice on Matters Concerning Total Ban on the Import of Solid Waste*, while China's domestic waste paper has been in shortage.

To address the supply issue, Tianjin Nine Dragons proposed the project with an investment budget of USD69.65 million (RMB500 million) to construct three production lines with a total of 320,000 t/a capacity for bio-based chemical fibre (dry matter yield) which are equipped with thermomechanical pulping (TMP) process. The finished product in this project will later be used as filler of sandwich-structured paper products, which is a security for the company's production operation and quality of paper products.



Overview of the 1st phase:

- Construction nature: Technological upgrading and transformation
- Total investment: USD48.75 million (RMB350 million), 1.2% (=USD0.60 million or RMB4.33 million) of which for environmental protection
- Location: Economic and Technological Development Zone of Ninghe District, Tianjin
- Site area: 9,900 m²
- Construction content: Two bio-based chemical fibre production lines supported with systems for material transfer, chipping, cleaning, dehydration, thermo-refining, etc.;
- Designed capacity: 213,000 t/a bio-based chemical fibre (dry matter), to replace the existing 290,000 t/a waste paper material
- Material usage: 230,700 t/a of brushwood (sourced from Tianjin and the neighbouring areas) and 214,900 t/a of wood chips (imported) as feedstocks in the pulping process.
- Working system: Currently-employed personnel in three 8-hour shifts for 340 days a year
- Construction period: Sept. 2021–Feb. 2022
- On-site monitoring: 21 March–24 March, 2023

TABLE 5: Technical indicators for bio-based chemical fibre pulp

Item	Unit	Index
pH	-	5–9
Residue on 32-mesh sieve	%	≤6
Freeness	CSF (Canadian Standard Freeness)	500–750

Source: Tianjin Nine Dragons

TABLE 6: Main raw and auxiliary material consumption

Item	Specification	Total Amount (of the whole project)	Amount (of the 1st phase)
Wood chips	length, 20–45 mm; thickness, 3–10 mm; roughly 50% water	161,160 t/a (dry matter)	107,440 t/a (dry matter)
Wood (brushwood)	length<0.4 m; thickness<3 m; roughly 50% water	173,060 t/a (dry matter)	115,373 t/a (dry matter)
Sodium hydroxide	30% solution	2,720 m ³ /a	1,813 m ³ /a

Source: Tianjin Nine Dragons

TABLE 7: Main material consumption change in pulping process

No.	Raw materials for pulping		Consumption, t/a (before)	Consumption, t/a (after completion of 1st phase construction)
1	Waste paper	US-Sourced waste paper	1,612,400	0
2		Domestic waste paper	403,100	1,725,500
3	Unbleached wood pulp		270,000	270,000
4	Commercial bleached wood pulp		32,500	32,500
5	Wood (brushwood)		0	230,700
6	Wood chips		0	214,900
Pulp volume (dry matter)			1,680,000	1,680,000

Source: Tianjin Nine Dragons

Nine Dragons Paper was established in 1995 and listed on the main board of Hong Kong Exchanges in 2006 as a leading enterprise in the global papermaking industry. Its domestic production operations cover Dongguan of Guangdong, Taicang of Jiangsu, Chongqing, Tianjin, Leshan of Sichuan, Quanzhou of Fujian, Shenyang of Liaoning, Hebei and Hubei, and it has one pulp paper facility in Beihai of Guangxi Zhuang Autonomous Region in planning. In global expansion, it is moving forward to round out its papermaking industrial chains with establishments in Vietnam, the US, Malaysia. By Dec. 2022, it has a total capacity of 18.77 million t/a in papermaking, ranking at the top in China in terms of capacity.

Nantong Sateri's 200,000 t/a solvent-spun cellulose fibre project (1st phase) enters operation

Summary: Nantong Sateri put the 1st phase of the 200,000 t/a solvent-spun cellulose fibre project into operation on 17 Aug.

On 17 Aug., Sateri (Nantong) Fiber Co., Ltd. (Nantong Sateri) put the 1st phase of the 200,000 t/a solvent-spun cellulose fibre project into operation, as summarised below:

1st Phase of 200,000 t/a solvent-spun cellulose fibre project:

- Construction nature: New construction
- Investment: USD284.92 million (RMB2.05 billion), of USD8.20 million (RMB58.90 million) which for environmental protection
- Location: Changjiang Town, Rugao City (county-level), Nantong City (prefecture-level), Jiangsu Province
- Site area: 321,072 m²
- Construction content and designed capacity: Two 50,000 t/a Lyocell staple fibre (1.33dtex×38mm) production lines, and waste treatment and utility facilities
- Working system: 680 workers in three 8-hour shifts for 365 days or 8,760 hours per year
- Start of construction: Aug. 2021



Founded in Aug. 2020, Nantong Sateri is the 3rd Lyocell production sites of Sateri Holdings Limited (Sateri), after the 1st in Rizhao City of Shandong Province—a 25,000 t/a Lyocell staple fibre production line completed in May 2020 in partnership with Asia Symbol (Shandong) Pulp and Paper Co., Ltd., which has laid a foundation for the company's Lyocell fibre business, and the 2nd in Liyang City (county-level) of Changzhou City, Jiangsu Province—a 100,000 t/a Lyocell fibre production line operational since Sept. 2022, ran by Sateri (Changzhou) Fiber Co., Ltd.

As the world's largest cellulose fibre producer, Sateri has established six cellulose fibres manufacturing factories in China, with a total production capacity of 1.8 million t/a for cellulose fibres made from raw materials supplied by the Brazil-based dissolving pulp plant (Bahia Specialty Cellulose S.A.) owned by Royal Golden Eagle (RGE), Sateri's parent company. To tap into the premium market, Sateri adopts imported cutting-edge devices and distributed control system (DCS) to produce high-strength fibre, non-woven fibre, flame retardant fibre and other differentiated, functional fibres. These six cellulose fibre operations have certifications of ISO9001, ISO14001, ISO45001, EU-BAT (best available techniques), HIGG FEM (Higg Facility Environmental Module) and HIGG FSLM (Higg Facility Social & Labor Module), STeP (Sustainable Textile & Leather Production) and STANDARD 100 by OEKO-TEX, the company being awarded the latter two for harmless products that meet the EU's requirements for human ecology. Sateri is the first cellulose fibre and Lyocell fibre manufacturer in China to carry the STeP and MADE IN GREEN by OEKO-TEX® product label.

On top of that, Sateri has built facilities for downstream products (yarn and nonwovens) to complete its industrial chain ranging from wood planting, to pulping, to production of cellulose fibres, yarn and nonwoven fabrics.



Price Update

TABLE 8: Average market prices of major raw materials of bio-based materials in China, July–Sept. 2023

No.	Product	Price, USD/t
1	Sugarcane	163.77
2	Corn	395.33
3	Wheat	405.55
4	Bagasse	39.49
5	Corn cob	36.09
6	Wheat straw	87.89
7	Corn stover	73.96

Source:CCM

TABLE 9: Average ex-works prices of major bio-based materials in China, July–Sept. 2023

No.	Product	Price, USD/t	Remark
1	PHA (Polyhydroxyalkanoates)	8,503	Films
2	PBS (Polybutylene succinate)	4,033	Extrusion grade and injection moulding
3	PPC (Propylene carbonate)	3,750	Injection moulding
4	PLA (Polylactic acid)	3,043	Injection moulding
5	PVA (Polyvinyl alcohol)	1,669	Flocculent
6	Starch-based material	3,067	Film moulding
7	PTT (Polytrimethylene terephthalate)	3,332	Fibre
8	PBAT (Polybutylene adipate terephthalate)	1,931	Film moulding

Source:CCM



News in Brief

20,000 t/a PDO Production project to settle in Qinzhou Port Area, Guangxi

On 30 June, a three-way investment and cooperation agreement was signed by Guangdong Tsinghua Smart Biotech Co., Ltd. (Tsinghua Smart), China-Malaysia Qinzhou Industrial Park (Guangxi) Investment Holding Group Co., Ltd. (CMQIP), and Guanghong Asset Management Co. Ltd. (Guanghong Asset). It aims to build a 20,000 t/a 1,3-propanediol (PDO) project in the Qinzhou Port Area of the China (Guangxi) Pilot Free Trade Zone, involving an investment amount of around USD62.68 million (RMB450 million), which will complement and extend the chemical industries already developed in the area, such as purified terephthalic acid (PTA), biodiesel, glycerol by-products. The project is a crucial step to forge a bio-based new material base in the Qinzhou Port Area.

In the second-phase construction of the project, CMQIP is planning to continue to ramp up PDO capacity, and to form PDO-based capacities for polytrimethylene terephthalate (PTT), biodiesel, also to add processing capacities for PPT spinning, engineering plastics, and degradable plastic products. The project's designed location will offer a quick access to raw materials, such as glycerol from the ASEAN (Association of South East Asian Nations) and molasses from the locality, to develop key areas of bio-based chemical fibres and the related raw materials, which will benefit the local green chemical industrial cluster development.

Tsinghua Smart was set up in Jan. 2017, dedicated to the R&D, production and sale of bio-based polyol, as well as the related technical services. It is the only high-tech company around the world that holds the technological and industrial capability to produce PDO from "glycerol+sugars" via fermentation processes. Prof. Liu Dehua, head of the Tsinghua Smart's R&D team, has started studying on PDO since 1998 making technological breakthroughs in the process, and has succeeded in the trial production of the 20,000 t/a sugar-process PDO production project in cooperation with Shanxi Changqing Biotechnology Co., Ltd. in July 2022.

HANVO Safety proposes 110,000 t/a biodegradable polyester rubber project

On 18 July, Jiangsu Hanvo Safety Product Co., Ltd. (HANVO Safety) notified a proposal for a 110,000 t/a biodegradable polyester rubber project, in a bid to speed up industrialisation of bio-based degradable polyester rubber and application of green rubber materials in producing gloves, tyres, shoes, etc.

According to the notification, the 110,000 t/a biodegradable polyester rubber project with an investment budget of USD139.30 million (RMB1 billion), will start the first phase building 10,000 t/a capacity. A new venture (tentatively named as Jiangsu Hengnuo New Material Technology Co., Ltd.) will be set up to undertake the proposed project, jointly by HANVO Safety, Rudong Yineng Enterprise Management Consulting Partnership (L.P.), Shenzhen Lixin Low Carbon Technology Co., Ltd., Beijing Beihuada Investment Co., Ltd., Guangzhou South China University of Technology Asset Management Co., Ltd., Tongcheng New Materials Co., Ltd., as well as natural persons Wang Zhao and Tang Zhenghai. The venture's scope of business covers R&D, production and sale of bio-based degradable polyester rubber and other novel environmental-friendly rubber materials.

Carbonauten to set carbon-negative materials plant and China headquarters in Chibi, Hubei

On 2 Aug., German-based Carbonauten GmbH (Carbonauten) signed an investment agreement with the local Government of Chibi City (county-level) of Xianning City (prefecture-level), Hubei Province, to build its carbon-negative materials production base and China





headquarters. The agreement plan involves EUR1.5 billion (RMB11.8 billion) of investment and expects an annual production of 500,000 tonnes of carbon-negative materials, valued at least EUR1.0 billion (RMB7.8 billion) per year after fully operation.

The 1st phase of the plan is to build a 5.33-ha factory area on which to build annual capacities of 200,000 tonnes of an assortment of carbon-negative bio-based composite materials, 16 million litres of bio-based plant growth stimulants, at least 160Gwh of renewable energy (heat, electricity and hydrogen energy), and at least 100,000 tonnes of CO₂ certificates. The 2nd phase of the plan is to build a circular economy industrial park concentrating carbon neutrality technologies on an area of 33.33 ha, and 80 sets of equipment and system totalling 500,000 t/a carbon-negative material capacity. It will also integrate upstream and downstream companies operating in CCUS (carbon capture, utilisation and storage) technology development and carbon-negative material application.

Xianning City has an abundant resource of bamboo, known as the famous "hometown of bamboo". The city has 1,200 km² of bamboo forest, accounting for 80% of the provincial bamboo forest resources. The hair bamboo/"Nanzhu" area is around 1,187 km², with a total number of 220 million of the species.

Carbonauten is an innovative, high-tech enterprise, dedicated to carbon neutrality. Its carbon-negative products include pyrolysis bio-oil, biostimulants, biocarbons and thermoplastic carbon-negative particles, derived from biomass residues (bamboo, crop straw wastes, etc.) and applicable to food, new material and green regenerative energy manufacturing.

NIMTE completes FDCA pilot-scale production

On 23 Aug., Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences (NIMTE) announced a successful pilot-scale production of 2,5-furandicarboxylic acid (FDCA), a bio-based platform chemical.

Founded in 2021 and being led by Professor Zhang Yajia, the bio-based furans technology team of NIMTE self-designed and developed China's first FCDA oxidation preparation system, started the system installation and commissioning, and brought the FCDA production scale up close to the industrial level within over 20 months of exploration and practice since early 2022. This FCDA oxidation preparation system features pollution-free, high safety coefficient, low energy consumption, high yield and cost efficiency.

This announcement marks a substantial breakthrough of China's engineering technology in the field of novel furan-based materials, and a robust foundation for domestic industrialisation of FCDA, PEF (polyethylene 2,5-furandicarboxylate), and the derivative products.

New Tuoyang Bio partners with HighChem for PLA development

On 9 Aug., New Tuoyang Bio-engineering Co., Ltd. (New Tuoyang Bio) and HighChem Company Limited (HighChem) reached a strategic cooperation agreement on the high-end polylactic acid (PLA) project development at the signing ceremony held in Zhengzhou City, Henan Province. The tie-up is to combine the two parties' strengths to drive the local bio-industry development.





Founded in Oct. 2018 with a registered capital of RMB350 million and owned by the state-owned company Henan Investment Group Co., Ltd., New Tuoyang Bio engages in R&D, smart production and sale of biological products. Its product portfolio can be categorised into three materials—sodium D-isoascorbate, vitamin C, and D-Ribose.

Founded in 1993, HighChem is an international trading company operating the Sino-Japan R&D, contracted production and trade of fine chemical products. It headquarters in Japan and has set offices in Shanghai, Chongqin, Beijing, Tianjin, Guangzhou, etc. In 2022, HighChem signed a strategic partnership agreement with China BBKA Group Corporation, to tap into the Japanese markets pivoting around PLA and other biodegradable materials.

Zhuhai Kingfa and Suzhou Juwei Yuanchuang to jointly industrialise straw-derived succinic acid

In early Aug., Zhuhai Kingfa Biomaterial Co., Ltd. (Zhuhai Kingfa) and Suzhou Juwei Yuanchuang Biotechnology Co., Ltd. (Suzhou Juwei Yuanchuang) entered strategic partnership agreement, to integrate industrial resources and push application, technological and application innovation of bio-synthetic straw-derived products, starting with straw-derived succinic acid (SA).

As per the agreement, Zhuhai Kingfa will play a part in planning and implementing the straw-derived SA application projects, with intended purchasing volume of straw-derived SA at a minimum of 10,000 t/a. Suzhou Juwei Yuanchuang will be responsible for planning and constructing and expanding capacity for straw-derived SA, to satisfy Zhuhai Kingfa's production consumption demand. This partnership is envisaged to carry China's non-grain biomaterial market to a next level.

Founded in June 2018, Suzhou Juwei Yuanchuang is a tech start-up in synthetic biology that had risen from Tsinghua University's entrepreneurship platform. It owns the technological base and breakthrough production processes for straw saccharification and bio-synthesis, to produce SA, 1,4-butanediol (BDO), α -Farnesene, and other commodities and high-value products.

Sanshu Bio closes pre-Series A funding round of tens of millions RMB

In Aug., Jiangsu Sanshu Biotechnology Co., Ltd. (Sanshu Bio) completed a pre-Series A funding round of tens of millions RMB, which was led by Nantong Investment Management, with the participation from Tech Cube Fund. The proceeds will be used in constructions across the industrial chain of plant-based new materials, including product development and applications of plant-based new materials, and setup of mass-spectrometric multi-omics and starch polysaccharide R&D platforms.

Sanshu Bio was founded in Dec. 2016 with a registered capital of RMB23.61 million. It has an integrated scientific research testing service platform related to mass-spectrometric multi-omics, starch polysaccharide analysis, and R&D and production of plant-based new materials, offering services including functional polysaccharide analysis, starch structure analysis, high-throughput sequencing, and proteomics and metabonomics analysis, to almost 5,000 universities, research institutes and enterprises. In the field of plant-based new materials, Sanshu Bio has built its own business ecosystem and operation mode that cover genome-editing, novel variety selection, cell factory, and production of plant-based new materials. Its operation includes a wide range of products, such as novel flame-retardant polyethylene materials, novel specialty starches, degradable plant-based materials, plant-based adhesives and capsules. The company has certifications of ISO9001 (Quality Management Systems), ISO45001 (Occupational Health and Safety Management Systems),





ISO14001 (Environmental Management Systems) and is certified by China National Accreditation Service for Conformity Assessment or CNAS.

Sanshu Bio said it would continue to tap into the key technologies in specialty starches and polysaccharide raw materials, delivery materials, degradable materials and modern agriculture, and to break down the barriers across the full supply chains from lab research to product manufacturing.



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Publisher : Kcomber Inc.

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