BCAA
中关村创蓝清洁空气产业联盟
BLUETECH CLEAN AIR ALLIANCE

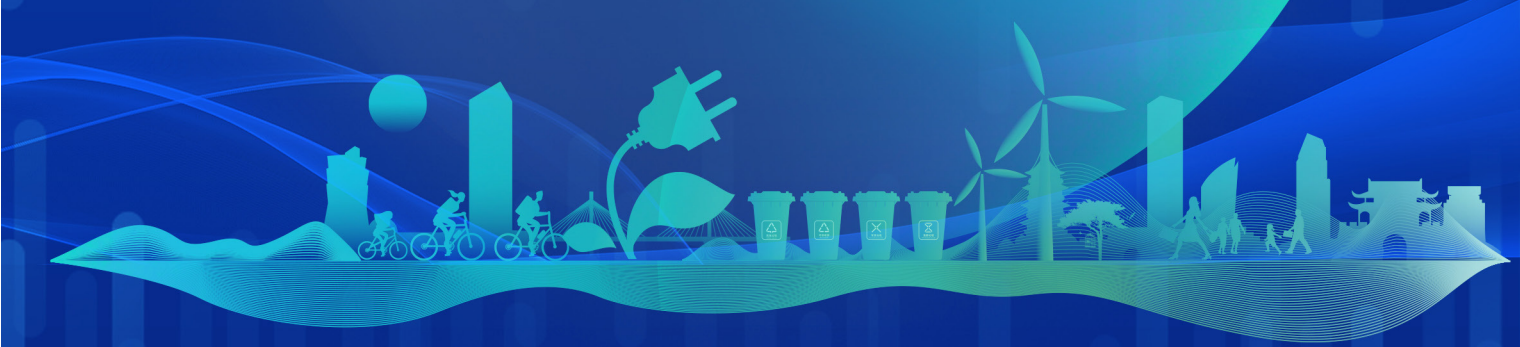
GFP 金融支持绿色科技平台
GREENTECH FINANCING PLATFORM

BLUETECH

CARBON NEUTRALITY PIONEERS AWARD

2022 Manual

SEEKING INNOVATORS WHO CAN ACCELERATE
THE GLOBAL CARBON NEUTRALITY PROGRESS



Introduction

In 2022, Bluetech Clean Air Alliance (BCAA) and the Greentech Financing Platform (GFP) jointly launched the "Bluetech Carbon Neutrality Pioneers Award ". The purpose of the award is to support and promote pioneering companies in the field of carbon neutrality, promote and disseminate the achievements of low-carbon technological innovation, and help China and the world to achieve carbon neutrality.

Based on the "Bluetech Award" launched in 2015, the "Bluetech Carbon Neutrality Pioneers Award " is focusing on the evaluation of technology enterprises and entrepreneurial teams in new energy, green transportation, energy storage, green building, energy conservation, intelligent manufacturing and other key tracks of low carbon technologies. The Bluetech Award has been carried out for six years, and a systematic evaluation mechanism and a project recruitment and acceleration networks across over 20 countries have been established.

Award-Winning Support

BCAA and GFP will provide the following support to the winning and participating enterprises:

Financing Assistance: Assist in matchmaking with lead & strategic investment funds;
IP Empowerment: Provide IP strategy guidance, establish IP portfolio, and manage IP risks;
Low Carbon Strategy Support: Provide professional guidance to help companies enhance competitiveness towards carbon peaking and carbon neutrality;
Industrial Matchmaking: Assist in systematic matchmaking with the industrial ecosystem of partners;
Demonstration & Publicity: Recommend companies participating in real-world demonstration projects, including relevant schemes under the United Nations networks;
Entrepreneurial Community: Assist in joining in the exclusive carbon neutral entrepreneur community.

Selection Advisory Committee

Jun MA Chairman
President of Institute of Finance and Sustainability (IFS)
Director of the Green Finance Committee (GFD)
Co-chair of the G20 Sustainable Finance Study Group

" Bluetech Carbon Neutrality Pioneers Award will bring together all parties to select and accelerate outstanding greentech companies that can accelerate the carbon neutrality progress in China and the world"

Advisory Committee

Kejun JIANG
Professor, Energy Research Institute of Academy of Macroeconomic Research

Guoliang LV
Consultant, WIPO Office in Chi
Former Director, International Division, China National Intellectual Property Administration

Hong LIANG
Co-chairman, Huatai Securities Institution Business Committee

Yuebing LU
Board Chairman, Air Liquide (China) Holding Co., Ltd.

Hao XU
Vice President, Sustainable Social Value Organization, Tencent

Shixu YANG
President, BP China

Zhenhua YU
Standing Vice President, China Energy Storage Alliance

Kai ZHAO
Standing Vice President, China Association of Circular Economy

Lin ZUO
Partner, Sequoia & Envision Carbon Neutral Fund

Executive Committee

(listed in alphabetical order)

Hongxing XIE
Director, Bluetech Clean Air Alliance (BCAA)

Lijian ZHAO
Director, Carbon Trust China
Head, Secretariat of Greentech Financing Platform

Woking Group

Wenqi DUAN Senior Advisor, Bluetech Clean Air Alliance; Partner, Thor Capital
Xin HE Technical Director, Bluetech Clean Air Alliance
Xi YANG Deputy Director, Science and Technology Center of Institute of Finance and Sustainability
Wenyi ZHANG Senior Advisor, Greentech Financing Platform; Vice President, Nature Elements Capital
Yuguang ZHOU Deputy Secretary-General, Bluetech Clean Air Alliance

Technical Expert Group

In order to support technical evaluation of relevant companies, the selection working group will establish a technical expert group, comprising of relevant technical and industry experts.

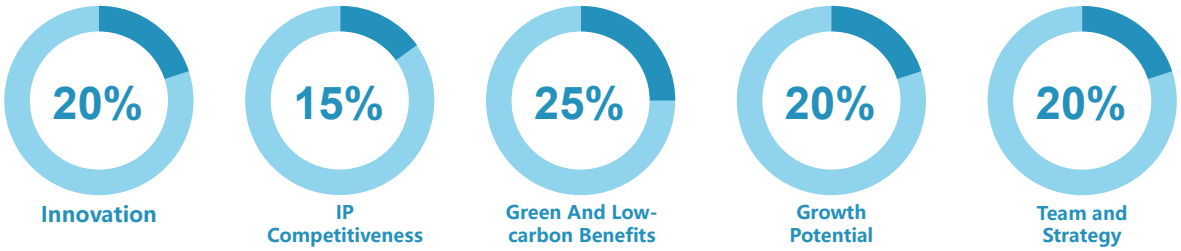
Award Introduction

"Bluetech Carbon Neutrality Pioneers Award" welcome green and low-carbon technology enterprises from around the world. The goal of the award is to select a number of outstanding domestic and abroad green technology enterprises and entrepreneurial teams every year. Through the process of award assessment and publicity, to promote and disseminate knowledge of green and low-carbon technologies, help investment institutions to identify excellent investment opportunities effectively, and support the rapid growth of those green enterprises. There is no charge for the award selection.

The award will set up evaluation teams, establish a scientific and fair scoring method and process to evaluate the applicant organization. The review will adopt a unified evaluation framework, process, evaluation standards and data quality control requirements, and focus on the following aspects:

- Special Evaluation: Pay attention to the "deeptech" attributes and industry leadership of the applicant, organize experts to carry out special evaluation for "Technical Features" and "IP competitiveness".
- Comprehensive Evaluation: Through expert review, systematically evaluate the comprehensive performance of enterprises and teams in terms of l innovation, green and low-carbon benefits, growth potential, team and corporate strategy, business model and other dimensions.

Selection Criteria



Application Requirements

1) Enterprises or entrepreneurial teams in the field of gree technology;

2) The products or services of the applicants have relative high technological content and innovative significance

3) The products or services of the enterprise have obvious greenhouse gas emission reduction benefits and other environmental benefits

4) The enterprise has a relatively good corporate governance mechanism and social responsibility performance.

Application Process

Applicants should go through the following steps to participate in the selection:

1) Download the application form (scan QR code or access Bluetech Award website http://www.bluetechaward.com)

Application Form

2) Fill in and submit the application form and relevant information before 31 March 2022;

3) Participate in online presentation and Q&A after passing the preliminary screening

4) Key shortlisted enterprises will be invited to participate in offline road show and communicate with exper

5) The award-winning enterprises will be invited to participate in awarding ceremony

Evaluation Process

The selection process include the following steps:

1) Preliminary screening: The selection group will conduct a document review and exclude the applications that does not meet the basic application requirements.

2) Second round evaluation: Applicants will be invited to join in an online presentation, expert review and scoring process, and a shortlist will be generated.

3) On-site investigation and evaluation: On-site investigation and assessment will conducted for some of the applications.

4) Off-line roadshows and expert evaluation: Invite ke shortlisted enterprises to participate in offline road shows and invite experts (including experts of the Selection Advisory Committee) to evaluate and score. The evaluation is expected to be completed by the end of May.

5) Determine the award winners: The award winners will be finally determined by the Selection Advisory Committee.

Award Ceremony

The award ceremony had been held in December 2022 at the annual meeting of the Greentech Financing Platform.

January 2022 Application Start → **March 2022** Application Deadline → **May 2022** Evaluation Complete → **June 2022** Award Ceremony and Promotion

Organizers

Founded in January 2013, Bluetech Clean Air Alliance (BCAA) focuses on the development of green and low-carbon technologies and industries and accelerating global sustainable development through technology transfer, technology assessment and demos, investment service, IP protection, and policy research. The members of BCAA include companies, research institutes and universities.

Over eight years' operation, BCAA has carried out pilot projects in 12 provinces and cities in China, published over 50 policy and market research reports, assessed over 500 advanced clean air technologies from 22 countries, established collaborations with partners across 22 countries. BCAA became an official strategic partner of the World Intellectual Property Organization (WIPO) in 2019. With the support of WIPO, Beijing Municipal Intellectual Property Office and other partners, BCAA launched the project of IP Enabling Green Technology, and carried out a series of activities and pilot work in the field of green technology intellectual property awareness raising and high-value patent cultivation, including IP strategy trainings, seminars, international transfer of green science and technology, city acceleration project, etc.

金融支持绿色科技平台
GREENTECH FINANCING PLATFORM

The Greentech Financing Platform (GFP) was initiated by the Institute of Finance and Sustainability (IFS) and partner organizations in May 2021. There are 12 founding members of GFP. The platform will make full use of the resources of IFS and partner organizations, and work together with green technology enterprises, financial institutions, and other stakeholders to promote the green technology innovation and deployment. GFP's work include establishing a green technology projects database and a regular exchange mechanism, connecting financial resources and green technology enterprises, etc. Members of GFP include financial institutions (PE/VC investors, banks, insurance etc.), green technology enterprises, and China domestic and international research institutions, scientists and engineers who provide green technology, etc.

Founding members of GFP include, Institute of Finance and Sustainability (IFS), the Green Finance Committee (GFC) of China Society for Finance and Banking, Beijing Green Finance Association, Beijing Private Equity Association, Finance Committee of Distinguished Expert Committee of Overseas Chinese Federation, Shanghai Private Equity Association, Bluetech Clean Air Alliance, China Association of Circular Economy, Green Technology Bank, China Energy Storage Alliance, Zhejiang Zhijiang Venture Capital Research Institute, and Energy and Environmental Service Industry Alliance (Z-Park). The Secretariat of GFP is hosted in the Greentech Innovation and Investment Gateway, which is jointly operated by the Institute of Finance and Sustainability (IFS) and the Carbon Trust.

Acknowledgement

- Institute of Green Finance & Sustainable Development
- The Green Finance Committee (GFC) of China Society for Finance and Banking
- Beijing Green Finance Association
- Beijing Private Equity Association
- Shanghai Private Equity Association
- Green Technology Bank
- Zhejiang Zhijiang Venture Capital Research Institute
- Sequoia & Envision Carbon Neutral Fund
- Hillhouse Capital Industry and Innovation Research Institute
- Enze Fund of Sinopec Capital
- CECEP Fund
- Cedarlake Capital
- Tsinghua Technology Transfer Fund
- Beihang Investment
- CAS Delta Capital
- Thor Capital
- China Association of Circular Economy
- China Association of Environmental Protection Industry
- Xiamen Environment Protection Vehicle Emission Control Technology Center
- Committee of Green Circular and Inclusive Development of All-China Environment Federation
- Energy Conservation Technology Promotion Committee of China Energy Conservation Association
- Chinese Renewable Energy Industries Association (CREIA)
- China Electric Vehicle Charing Technology and Industry Alliance
- Council of Industry and Technology Alliances In Z-Park
- ZGC International
- Energy and Environmental Service Industry Alliance
- China Energy Storage Alliance
- Tsinghua X-Lab
- University of Science and Technology Beijing National Science Park
- Tus-Holdings Science & Technology Park (Ningbo)
- BUAA Tianhui Incubator
- C Team
- The United Nations Development Programme (UNDP)
- WIPO GREEN
- WWF
- Japan International Cooperation Agency (JICA)
- Plug and Play China（PNP）
- Carbon Trust
- RX S-Future
- Manufacturers Of Emission Controls Association
- US-China Clean Tech Center (UCCTC)
- M-Hub
- IVL Swedish Environmental Research Institute
- Korea Energy, Climate Change and Environment Association
- Swiss Clean Technology Association
- State of Green (Denmark)
- Impact Hub Shanghai

Application Method: Visit http://www.bluetechaward.com, or scan the QR code to download the application form or contact us.

Tel: 010-52878481 E-mail: bluetech@iccs.org.cn

Bluetech Acceleration platform for Carbon Neutrality Technology

In order to support the rapid development of the winners and participants of Bluetech Carbon Neutrality Pioneers Award, the Alliance and its partners have jointly set up the Bluetech Acceleration Platform for Carbon Neutrality Technology , which has opened up an "acceleration expressway" for the application and promotion of related technologies in China and the world through the following: matchmaking with financial resources, IP strategy training and consultation, and low carbon strategy training and consultation, participating WIPO GREEN acceleration projects for technology demonstration, and the establishing collaborations with industrial partners, and etc.

- **Bluetech Carbon Neutrality Pioneers Award**

In cooperation with the Greentech Finance Platform, based on the BLuetech Award launched in 2015, the Bluetech Carbon Neutrality Pioneers Award was launched in 2022 covering the full tracks of low carbon technologies. The award achieved support from the leading investors as Sequoia Capital, Hillhouse Capital and K2VC, as well as the industrial resources such as Tencent, BP and Air Liquide. Winners will get benefits such as IP empowerment, low-carbon strategy support and participation opportunities in UN pilot projects. Since 2015, the Blue Award has collected and evaluated more than 500 green science and technology projects from more than 20 countries.

- **Super Expressway for Financing**

The alliance has established cooperations with over a hundred investors focusing on low carbon technologies. To support the financing of collaborating Greentech companies, BCAA will organize relevant roadshows and matchmaking activities with investors, and provide financing services as below:

- Large-scale roadshow: Invite enterprises to participate in related green technology roadshows organized or participated by the alliance, and invite hundreds of Greentech investors to join in the matchmaking;
- In-depth financing service: Focus on the financing needs of collaborating enterprises, select key investment institutions, and assist enterprises in financing docking, project investigation and consultation, due diligence, etc.;
- Financing strategy consultation: guide enterprises to sort out future development strategies and financing strategies, optimize Business Plan and equity plans, and interact with investors more effectively.

- **IP Strategic Support and Service**

Since 2017, BCAA has established the module of IP Strategic Support for Green Technology, with support from WIPO, Patent Offices, domestic and International IP experts, law firms and consultancies. Following progress has achieved:

- Organized four "Innovating for a Green Future" IP strategy training events with WIPO and Beijing Intellectual Property Office as co-organizers, covering the topics of IP strategy of enterprises, IP risk management, technical secret management, PCT patent application, IP optimization of investment, etc.
- Carried out 8 rounds of Enterprise IP strategy Consultation Pilot Projects on IP strategy formulation, cultivation of high-value patents, establishment of IP management system, science and technology innovation board counseling and cultivation of science and technology attributes;
- Produced and released IP analysis industrial reports on different sectors, such as energy storage and fuel cells.

- **WIPO GREEN City Acceleration Project and Technology Demonstration**

In 2021, BCAA joined hands with the United Nations World Intellectual Property Organization Sustainable Technology Exchange (WIPO GREEN) to introduce WIPO GREEN City Acceleration Project. Focusing on the green challenges faced by cities, the pilot project conducts evaluation and collects green technology needs from the city, and recruits green technologies from all over the world based on these needs, so as to promote the application of technologies in cities and accelerate the green development of cities. In 2021, the first pilot project landed in Beijing, and two demonstration projects have been launched successfully in 2022. In the future, BCAA will support to launch more WIPO GREEN Acceleration City pilots and create more opportunities of green technology demonstration for green technology owners.

➢ **Matchmaking with Industrial Resources**

BCAA invited different industrial partners to join the cooperation platform, and supported the award-winning enterprises to deeply connect with their industrial eco-systems. In 2022, BCAA has organized the matchmaking activities between selected award winners and some multinational & industrial giants such as BP, Tencent, Jingbo Group and Jiangsu Feixiang Group. As one of the co-founders, BCAA joined in the "Carbon LIVE", an online low-carbon innovation community led by Tencent, to support the docking of early innovative technologies and resources in the dual-carbon field. In the future, BCAA will expand industrial cooperation resources to include more industrial eco-systems.

➢ **Low Carbon Competitiveness Enhancement for Green Technology Enterprises**

With over 20 years experience, Carbon Trust is a world-renowned carbon consulting company, which has participated in the formulation and development of a series of global carbon emission measurement and certification standards and guidelines,. Carbon trust had served for many multinationals world wide, and some leading business in China as well, such as Tencent, Alibaba, Longji, Vision Group and Ocean Group. Carbon Trust acts as a strategic partner of this module, to support the activities and services including: regular training, one vs one in-depth tutoring session, and consultation projects.

➢ **Commercialization of Green Scientific and Technological Achievements**

In order to speed up the Commercialization of green scientific and technological achievements and support more scientific and technological achievements to enter the commercialization path, BCAA started the module of green scientific and technological achievements transformation to provide one-stop cultivation services for early scientific and technological projects, including: providing funds and venues for applied research and development, Docking the financing resources at different rounds (seed round, angel round and AB round), Carry out systematic intellectual property support, and matchmaking with upstream and downstream industrial resources, etc. Through the above work, BCAA can help scientific research teams and innovative projects to quickly enter the commercialization state, shorten the commercialization process, and guide more green innovative technologies to quickly enter industrialization.

Global Partner Network

In the past six Bluetech Awards, we have received strong support from many cooperative institutions, including:

◎ Swiss Emission Reduction Technology Verification Association
◎ American Emission Control Manufacturers Association
◎ Air and Pollution Management Association (USA)
◎ Italian Chamber of Commerce
◎ UK Trade and Investment Agency
◎ China Electric Vehicle Charging Technology and Industry Alliance
◎ China Highway Society
◎ International Wisdom Platform of Environmental Protection Technology
◎ TEDA Low Carbon Economy Promotion Center
◎ China Expo
◎ Japan External Trade Organization
◎ Japan International Cooperation Agency
◎ Zhongrui Innovation and Entrepreneurship Base
◎ Energy Foundation (China)
◎ China Industrial Environmental Protection Promotion Association
◎ Canadian Chamber of Commerce in China
◎ EU Chamber of Commerce in China
◎ China Equity Fund Investment Association
◎ Beijing Global Village Environmental Education Center
◎ Green Country (Denmark)
◎ China Dezhou Entrepreneur Innovation Platform
◎ China-UK Business Association
◎ Sino-US energy cooperation projects
◎ Embassy of Canada
◎ Changzhou Environmental Science Research Institute
◎ Shenzhen Environmental Science Research Institute
◎ Water platform
◎ Zhongguancun International Environmental Industry Promotion Center
◎ Sino-Italian environmental protection cooperation project
◎ Iranian Embassy
◎ Japan Science and Technology Agency
◎ Zhongguancun Federation
◎ Beijing Collaborative Innovation Institute
◎ Energy and Environment Branch of China Society of Environmental Sciences
◎ Publicity and Education Center of the Ministry of Environmental Protection
◎ Asia Society (USA)
◎ British Clean Air Alliance
◎ China Cultural Office (Austria)
◎ US-China Clean Technology Center (USA)
◎ Korea Energy Climate Change and Environment Association
◎ Swiss Clean Technology Association
◎ World Future Committee (Germany)
◎ French Chamber of Commerce and Industry
◎ Clean Industry Cluster Association (Denmark)
◎ International Laboratory of Air Quality and Science (Australia)
◎ Commonwealth Scientific and Industrial Research Organization of Australia
◎ New Zealand Trade Development Council
◎ International Council for Local Sustainable Development (Korea)
◎ Motor Vehicle Emission Monitoring Center, Ministry of Environmental Protection
◎ Professional Committee of Green Finance of China Finance Society
◎ China Biomass Energy Network
◎ China Energy Network
◎ Shanghai Environmental Protection Exhibition
◎ Beijing Energy Network
◎ Swiss Chamber of Commerce in China
◎ International China Environment Foundation
◎ China French Chamber of Commerce
◎ Tsinghua University Environmental College
◎Smogathon
◎ Danish Embassy
◎Los Angeles Cleantech Incubator
◎Plug and Play
◎Young Green Tech Entrepreneurs Forum
◎Bay Area Council
◎Prospect Silicon Valley
◎World Alliance for Efficient Solutions
◎Aquilaris
◎ Energy Conservation Service Industry Committee of China Energy Conservation Association
◎ Machinery Industry Environmental Protection Industry Development Center
◎ Swedish Academy of Environmental Sciences Beijing Representative Office
◎ Motor Vehicle Pollution Prevention Committee of China Environmental Protection Industry Association
◎ Exhaust Gas Purification Professional Committee of China Environmental Protection Industry Association
◎ Professional Committee of Volatile Organic Compounds Pollution Prevention and Control of Chinese Society of Environmental Sciences
◎ Water-based Coatings Sub-professional Committee of Coating and Painting Professional Committee of China Chemical Industry Society
◎ Xiamen Environmental Protection Vehicle Pollution Control Technology Center
◎ Foreign Cooperation Center of Environmental Protection, Ministry of Environmental Protection

2022 Bluetech Carbon Neutrality Pioneers Award Winners

The 2022 "Bluetech Carbon Neutrality Pioneers Award" was launched on January 27th, 2022. The solicitation was completed in May 2022, and the evaluation work was finally completed in October 2022 after preliminary screening, online roadshow, special evaluation of IP and technology, etc.

Disclaimer

Bluetech Clean Air Alliance (BCAA) launched the solicitation and evaluation activities of " Bluetech Carbon Neutrality Pioneers Award", and entrusted Ke Ling Aier (Beijing) Environmental Technology Center as the technical support unit to carry out relevant technical evaluation. In accordance with the provisions of relevant laws and regulations, BCAA organized and carried out this appraisal activity in an objective, just and fair position. In order to ensure the seriousness and scientificity of the evaluation results, BCAA has put forward clear requirements to all participating units: (1) The participating technologies provided by participating projects are the technologies with intellectual property rights owned by our company or those authorized by legal channels and entitled to the evaluation of "Bluetech Carbon Neutrality Pioneers Award"; (2) The participating technologies provided by participating projects do not infringe the intellectual property rights and other legitimate rights and interests of third parties; (3) The information related to participating technologies provided by participating projects is true and reliable; (4) Confidential information provided by participating projects has been marked with "confidential", "secret" or similar labels before submission, and those not marked shall be regarded as information that can be made public; (5) Participating projects do not make exaggerated and false propaganda by using relevant information of awards; On the basis of relevant information provided by participating units, BCAA will organize experts in related fields to make objective evaluation of participating projects.

BCAA solemnly declares that the award evaluation by BCAA is based on the data, information and materials provided by participating units, and limited verification work has been done for some projects that have been evaluated in detail. BCAA cannot guarantee the authenticity and accuracy of the information provided by participating units. BCAA will not assume any legal responsibility for any technical information and news related to awards published or reproduced without the permission of BCAA, or for any modification of the words, pictures or links related to awards on the website without the permission of BCAA. The final interpretation right of the above statement belongs to BCAA.

Award Winners(2022)

In the 2022 Bluetech Carbon Neutrality Pioneers Award, a total of 17 enterprises won the Bluetech Carbon Neutrality Pioneers Award, including six at Start-up Stage, Seven at Early Stage and four at Expansion Stage. The winning enterprises and their core technical information are as follows:

Enterprise Name	Core Technology
Start-up Stage	
Linhe Climate Science & Technology (Beijing) Co., Ltd.	Renovating Carbon Caputure & Utilization
Shanghai Firm-Lithium New Energy Technology Co., Ltd.	Sulfide Electrolyte All-Solid-State Lithium-ion Battery Technology
Amazinc Energy Limited	Zinc-based Battery Technology
Tangju New Materials Co., Ltd	Fabrication of Nano Cellulose
Ningbo Topcentral New Material Co., Ltd	Polymer Materials and Equivalent Recycling Technologies
Beijing Jaran Hydrogen Energy Technology Co., Ltd.	Modular Directional Purification
Early Stage	
GRST Holdings Limited	Water Based Manufacturing, Recycling, Regeneration and Reuse Processes for Lithium-ion Battery
Luoyang Weida Petrochemical Engineering Co.,Ltd	The Cold Regenerated Catalyst Cycling (CRC) Technology for Oil Refining Sector
Shanghai Maxtropy Data Technology Co.,Ltd.	Smart Industrial Energy and Carbon Management System
Zhongding Hengsheng Gas Equipment (Wuhu) Co., Ltd	Diaphragm Compressor
Beijing Fenergy Technology Co., Ltd.	Hydrogen Fuel Cell Catalyst, MEA and Stack
Nanjing Joes Future Food Technology Co., Ltd.	Cultured Meat Creation and Core Technology
Lanzhou Lanshi Zhongke Nanotechnology Co., Ltd.	Industrial Hazardous Solid Waste Recycling and High value Reuse Technology with Buble Liquid Membrane Method as the Core
Expansion Stage	
Beijing Shougang LanzaTech Technology Co., Ltd.	Ethanol and Protein Production from Carbon Containing Industrial Off Gas via Biosynthetic Technology
ZHONG-CHU-GUO-NENG (BEIJING) TECHNOLOGY CO.,LTD.	100MW Advanced CAES System
Beijing Bluepha Microbiology Technology Co., Ltd.	Biological Fermentation Technology Using Carbon Dioxide and Conventional Biomass as Dual-carbon Sources
HOREN CORTP Co., Ltd.	Packaging as a Service

Start-up Stage

Linhe Climate Science & Technology (Beijing) Co.,Ltd.

Technical field:

Carbon Capture, Utilization, and Storage Technology

Application technology:

Renovating Carbon Caputure & Utilization

Company profile:

◎ Linhe Climate Science & Technology (Beijing) Co.,Ltd.(hereinafter referred to as "Linhe Climate Technology") is a technology enterprise which takes distributed carbon dioxide capture and utilization as its core solution and drives the new production track at the right end of the carbon neutral balance. It was founded in April 2021, and was jointly founded by Professor Chen Xi, tenured professor of Columbia University and director of Geoengineering Center, and Mr. Sheng Xitai, chairman of Hongtai Aplus. Its headquarters is in Beijing, and its R&D center is located in Xi 'an.

◎ Linhe Climate Technology has the core intellectual property of carbon dioxide adsorption material with special nanostructure, which can capture and release carbon dioxide by controlling the change of dry humidity. It is a new low-cost and low-energy solid material carbon dioxide capture technology. At the same time, carbon dioxide with different concentrations can be provided according to the specific requirements of downstream carbon utilization scenarios through air-oriented or centralized emission source capture.The carbon dioxide can be converted into biomass, raw materials, fuels and other products with added value, or form carbon sinks, thus achieving the effect of engineering removal of carbon dioxide from the atmosphere or centralized emission sources.

Chen Xi, founder of Lin Climate

Technical Introduction:

◎ Core Technology: Dry-Wet DAC Technology

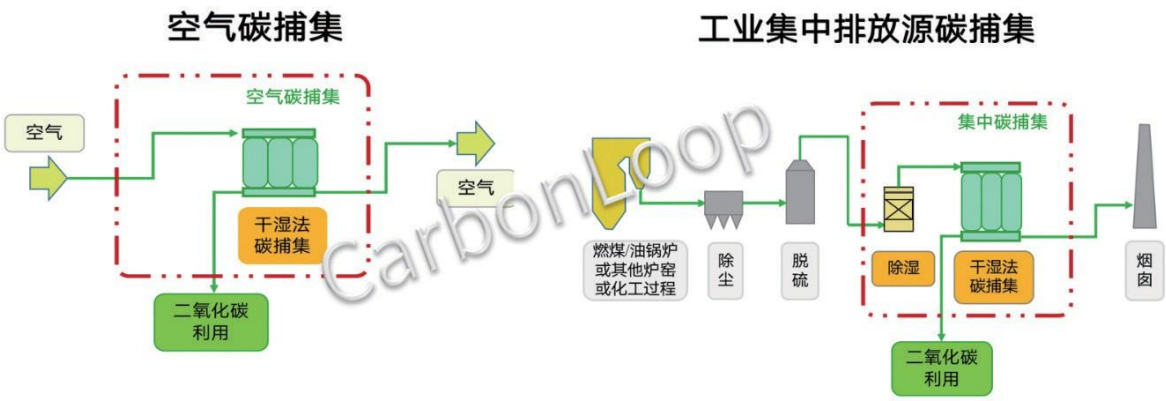
- The dry-wet DAC technology developed by the team led by Professor Chen Xi, the chief scientist of Lin Climate Technology, is a technology that can realize "negative emission" with low cost and low energy consumption. The method puts forward an innovative chemical technical scheme that "the direction of hydration reaction can be controlled only by humidity under the condition of nano-constraint". Using this method, the team developed a Moisture Swing Carbon Capture Material (MSCCM), which can directly capture CO_2 in the air when it is dry, and desorb CO_2 when it is wet. Its capture performance has been verified by a third-party testing organization. Therefore, it is proved theoretically and experimentally that low-cost nanomaterials containing functional groups can adsorb or desorb CO_2 by controlling humidity. In this process, CO_2 adsorption and material regeneration only need to dry or wet the materials, and a cycle can be completed in just a few minutes. The material cost is low, the operation mode is simple, and no additional heating is needed, thus creating a huge market and its industrial chain of air capture CO_2 and "negative emission".

- The air CO_2 capture system developed by our team is an efficient, environmentally friendly, and inexpensive CO_2 capture device. This technology uses nano-structured CO_2 absorbent, which can directly capture CO_2 in the atmosphere without any external energy. The captured CO_2 can be spontaneously released through reverse reaction only by increasing humidity. The cost of CO_2 capture by this technology is higher than that of other technologies.

The method of taking CO_2 is generally more than one order of magnitude cheaper, and it can be captured on the spot where it needs to be used, without transportation. This technology is suitable for capturing CO_2 from the high concentration of power plant tail gas to the low concentration of atmospheric CO_2, and the extracted high concentration CO_2 can be used in various industrial and agricultural fields.

◎ Core product: Moisture Swing Carbon Capture Material (MSCCM)

- The company's core product is Moisture Swing Carbon Capture Material (MSCCM) developed based on CO_2 adsorption mechanism of wet regeneration. The material has low cost, it can automatically chemically adsorb carbon dioxide in the dry state, and only a small amount of water vapor can release carbon dioxide. By adjusting the vacuum degree in the release process, the carbon dioxide/air mixture with any concentration can be obtained, and the distributed capture can be connected with any subsequent utilization, and the transportation cost is basically zero. Humidity-controlled adsorbent is a kind of renewable adsorbent with low cost and low energy consumption. It can be regenerated only by drying with solar heat, and can be reused for a long time. It has outstanding technical advantages of renewable, low cost, high efficiency, low energy consumption, environmental protection and good circulation. Compared with traditional methods, the investment and operation costs are significantly reduced.



Collecting Flow Chart of Dry-wet DAC Device

Series MSCCM CO_2 Adsorption Materials

Shanghai Firm-Lithium New Energy Technology Co., Ltd.

Technical field:

Energy Storage Technology

Application technology:

High Safety Sulfide Electrolyte All-Solid-State Lithium-ion Battery Technology

Company profile:

◎ Shanghai Firm-Lithium New Energy Technology Co., Ltd.. was established on May 17th, 2021. The company concentrated on the research and industrial layout of solid-state batteries, and has made breakthroughs in materials and preparation technologies of all-solid-state lithium batteries. The company has a research and development experimental base in Shanghai Lingang New Area. The core technology of the company comes from Shanghai Jiaotong University. The R&D team is led by Professor Zhang Xi, the director of Intelligent Vehicle Institute of Shanghai Jiaotong University, the vice president of Artificial Intelligence Research Institute, and a research scientist in the Department of Electrical and Computer Engineering of University of Michigan, USA. It combines the multidisciplinary team strength of Shanghai Jiaotong University and has rich experience in battery development. At the same time, the company's marketing, operation and process teams also have rich working experience in the field of new energy products. As a continuous entrepreneur, Mr. Wang Wei, the marketing director, has 18 years of experience in operator management and is also a famous angel investor. Mr. Shen Hui, Director of Operations, once worked for United Automotive Electronics, responsible for product management and project management. Mr. Qiao Pei, the process director, has 10 years of working experience in new energy manufacturing enterprises, and rich experience in power battery production and equipment management.

Zhang Xi, founder of Shanghai Firm-Lithium

◎ At present, the company is making every effort to accelerate the industrialization of solid-state lithium batteries, aiming to produce the safest and most high-energy lithium battery products. Compared with the liquid battery which is widely used at present, the solid-state lithium battery has the characteristics of high energy density, high charging speed and high safety, and is widely recognized by many automobile enterprises and investment institutions as the inevitable choice of the next generation power battery. The company plans to complete the pilot test and on-board test of all-solid-state batteries in 2022, reaching the national standard for electric vehicle batteries and achieving the scheduled capacity index.

Technical introduction:

◎ Based on the disadvantages of existing lithium batteries in the market at present, Shanghai Firm-Lithium New Energy Technology Co., Ltd. is committed to the development and application of key materials for high-energy batteries, facing the requirements of long battery life and high safety. After long-term research and experiments by R&D team, it has made breakthroughs in the materials and preparation technologies of all-solid-state lithium batteries.

◎ The negative electrode stability is improved by lithium metal modification engineering, thus improving the affinity with electrolyte, and the compatibility between electrolyte and lithium metal anode is improved by interface engineering. Brand-new sulfide is selected as the new electrolyte. Compared with traditional liquid lithium ion batteries (lithium iron phosphate battery and ternary lithium battery), solid sulfide is the electrolyte, which has the advantages of high energy density, high charging speed, non-flammability, no volatilization, no leakage and so on, thus improving the safety and environmental friendliness of the battery.

◎ The company's R&D team is deeply involved in the development and application of key materials for high-energy batteries, and has established a complete R&D system integrating "material development-electrochemical modeling-material optimization-test verification" for the needs of long battery life and high energy density. The company initiated a set of material informatics methods to model the solid-state battery as a whole, which can greatly shorten the time of material screening and provide the direction for material modification more efficiently.

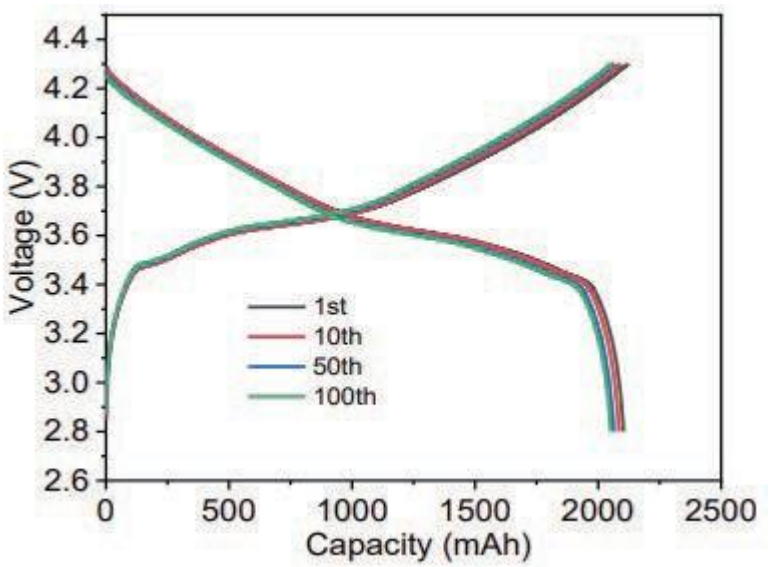
- In-depth electrochemical mechanism of battery, from the angle of ion mass conservation and charge conservation,

the positive electrode, negative electrode, electrolyte, Interface modeling and analysis; Every place has a related mathematical expression, and then through the boundary conditions, the overall solution.

- In the stage of material research, by changing the ratio of different materials, the related material properties are brought into the model, and the material properties are calculated and verified in advance, and then the materials with good calculated results are subjected to ratio experiments and actual verification, thus greatly shortening the time of material screening;
- The rapid prediction of battery performance by material informatics and electrochemical model can efficiently provide the direction for material modification, greatly shorten the material ratio, improve the research and development cycle and cost, and improve the comprehensive performance of the battery.

◎ At present, the company has completed the preparation of 2Ah solid-state battery cell, with the energy density of 410Wh/kg and the number of cycles of 1000, and the battery cell has passed the certification of a third-party testing organization, meeting the requirements of GB/T 31486-2015.

Product Appearance



Charge and Discharge Test Curve

Amazinc Energy Limited

Technical field:

Energy Storage Technology

Application technology:

Zinc-based Battery Technology

Company profile:

◎ The founding team of Amazinc Energy Limited comes from Songshan Lake Material Laboratory and City University of Hong Kong. Aiming at the safety problems caused by the extensive application of lithium batteries in the current market, the company is committed to providing extremely safe and high-performance zinc-based batteries and clean energy solutions for uninterruptible power supply and energy storage market.

◎ The company won the honors of "the most valuable scientific and technological achievement" at the 2021 China Innovation and Entrepreneurship Fair, "Excellent Product Award" at the high-tech fair, "Gold Award" at the 5th China International Invention and Innovation Exhibition in 2022, and outstanding postdoctoral project in national innovation and entrepreneurship.

Tang Zijie, Founder of Amazinc Energy Limited

Technical introduction:

◎ In recent years, rechargeable battery technology has the characteristics of large energy scale, flexible site selection and fast response, etc., and has been taken as the research focus of power grid energy storage by research institutions in various countries. Among them, lithium-ion battery energy storage technology accounts for the vast majority of the total installed energy storage capacity in China. However, the safety of lithium batteries has not been completely solved, and once a battery has a problem, it is easy to cause thermal runaway. As the energy storage market heats up, safety accidents occur frequently. For example, "4.16" Beijing Dahongmen Energy Storage Power Station caught fire, which killed one employee and killed two firefighters. At the same time, the lithium battery recycling is about to break out, but the recycling efficiency is still not high under the current technical conditions, and heavy metal elements are easy to cause secondary pollution. The shortage of lithium resources also puts pressure on lithium batteries to save energy and reduce costs.

- Zinc-based battery has experienced a long development since it was invented in 19th century. Its advantages as energy storage battery include:
  - Absolutely safe. Using water electrolyte, there is no risk of combustion and explosion.
  - Environmental friendly. There is no pollution to raw materials, no harmful substances are discharged in the production process, and the recycling process is green and efficient.
  - Low cost. Not only the price of raw materials is low, but also the production investment is low.
  - The relative energy density in water system is high, so it has advantages of volume and cost in developing energy storage system .

Zinc-based Battery Series Products

Tangju New Materials Co., Ltd

Technical field:

Green Degradable Material

Application technology:

Fabrication of Nano Cellulose

Company profile:

◎ Ningbo Tangju New Materials Technology Co., Ltd. is a high-tech enterprise focus on the research and development of bio-based degradable materials that meet the market demand. The company's entrepreneurial team is composed of PHDs returned from Germany and industry elites, and its core members are four PHDs, who have the working experience of world-renowned high-tech companies. The entrepreneurial team covers all-round talent system in the industrial chain from basic research to development and application to marketing, and realizes the full series integration of R&D and application.

Zhou Mengbo, founder of Tangju

◎ The company is committed to the development and industrialization of nano-cellulose. The main products are carboxylated nanometer cellulose (CNF), cellulose nanometer whisker (CNC), bacterial cellulose (BC) and so on. The company has well R&D and production conditions, with an annual production capacity of over 500 tons; At present, their products serve many customers at home and abroad, and it is a high-tech enterprise integrating R&D, production and sales of new materials. By now, one invention patent is authorized and three applications are pending. The company's characteristic products are nano-cellulose, which can be widely used in degradable food packaging films, water-based coatings, medical and cosmetic industries and other fields.

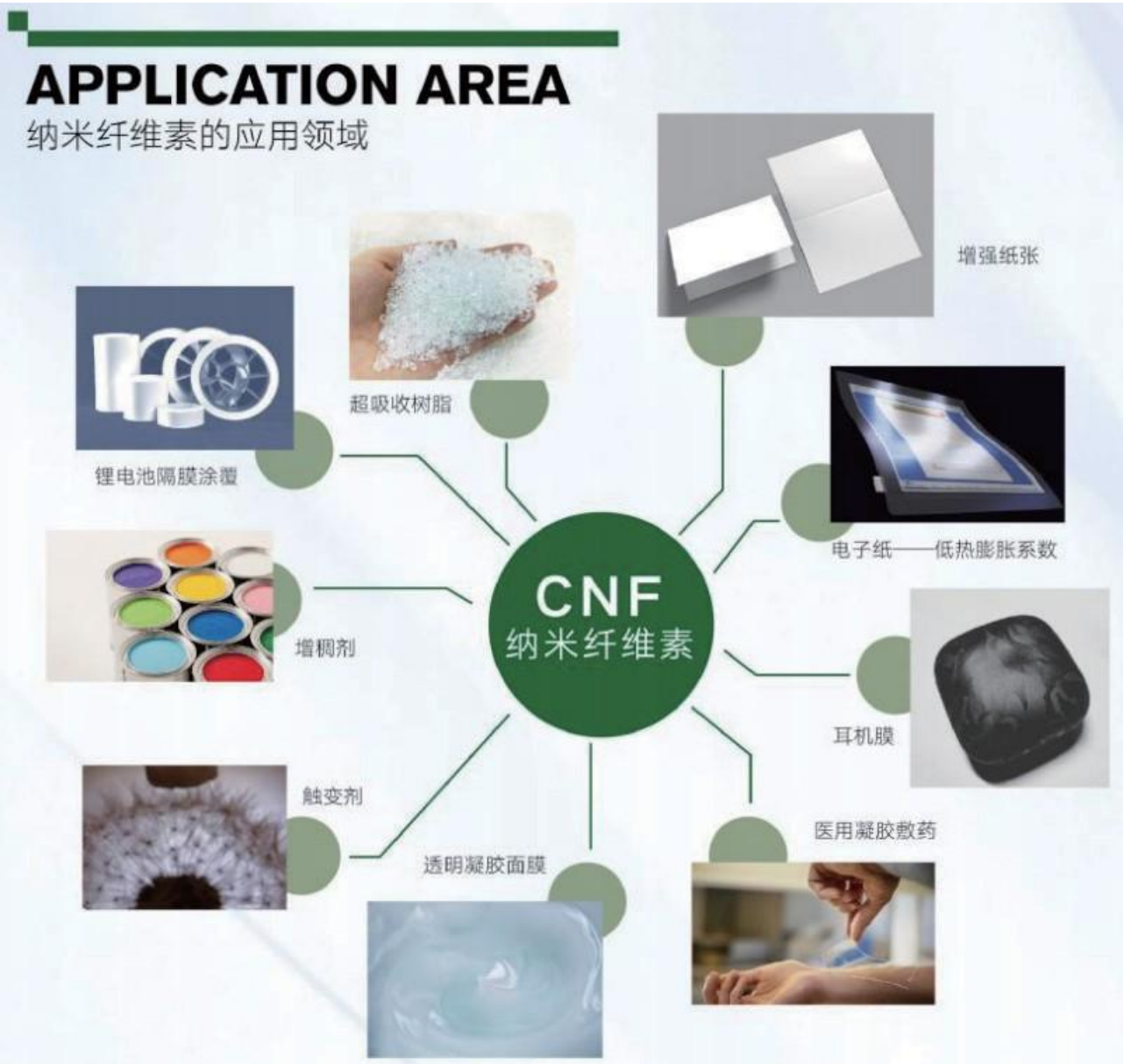
◎ The company established the first clean workshop of nano-cellulose in China, and the production equipment was kept in close cooperation with overseas research institutions by German custom-made companies. By introducing German and Finnish technologies, the company continued to promote the in-depth development and application of bio-based materials, and expanded the broader market space. The company is determined to become the invisible champion in the natural polymer material industry and an outstanding enterprise in the incubation, industrial development, marketing and capital operation of biological high-tech projects. At the same time, relying on the advantages of Ningbo port city and Ningbo e-commerce platform, we will build an innovative, leading and win-win international team.

Technical introduction:

◎ The company's technology takes "bio-based polysaccharides" as the core, and its core technology products include nano-cellulose, modified chitosan, modified starch, etc.

◎ Nanocellulose properties:

- The length is 100nm-1000nm and the width is 5-50nm, which has many excellent properties.
- It can absorb water 200 times its own weight, and has excellent water retention effect.
- Increase the stability of the system (double the settlement prevention)
- Increase toughness and mechanical strength (increase by 80%)
- Low expansion coefficient (one-fifth of aluminum alloy and one-tenth of engineering plastic)



Application Scenarios

Ningbo Topcentral New Material Co., Ltd

Technical field:

Disposal and Recycling of Wastes

Application technology:

Polymer Materials and Equivalent Recycling Technologies

Company profile:

◎ Topcentral® focuses on R&D of green low-carbon functional materials, high-value recycled plastics and new material modification, integrating R&D innovation, testing and analysis, manufacturing, sales and technical services, etc., and provide innovative solutions of new material systems with specialization, high performance, functionalization, and customization.

◎ The company is mainly engaged in independent research and development, and is committed to breaking through the technical problem of circular economy material sticking neck in conjunction with university research institutes.

Ma Yiming, founder of Ningbo Topcentral

Technical introduction:

◎ The company's main products are rPC, rABS, rPET and rPA.

◎ PCR polycarbonate (Pulizi PCR PC®) is a high-performance recycled material, which is prepared by recycled products (including but not limited to drinking water buckets, building boards, car lamps, container shells, lenses, compact discs, etc.), and through the technological processes of recycling, sorting pretreatment, cleaning and standardized granulation modification. According to different recycling sources and quality grades, we design classification and screening, technological innovation breakthrough, performance re-optimization and high-quality automatic production and processing, to provide customers with Pulizi ™ PCR PC® particles of extrusion grade and injection grade.

The company covers high-molecular, medium-molecular, low-molecular, colorless transparent, blue transparent, black and other different colors and product series, which can meet the different application needs of customers in the industry. At the same time, it can provide all-round customized system solutions and innovative solutions according to customers' special requirements. RPC products include three series: general series TcycleGP® of PCR Topcircle®, function and customer customization series of PCR Topcircle® and "zero" carbon product series of PCR Topcircle®FreeCBO2®. Topcircle® series products have the main characteristics of high quality stability, strict control of black spots and appearance, small and continuous color fluctuation, excellent impact resistance and easy processing and molding. Pulizi PCR PC® function and customer customization series products are customized products according to the specific requirements of customers, to meet the special comprehensive requirements of different technical characteristics, usage scenarios, application innovation, laws and policies, etc. PCR Top CircleFree CBO2Zero "carbon product series is a 100% carbon neutral product series, providing customers with worry-free" zero "carbon product solutions.

◎ PCR polyacrylonitrile-butadiene-styrene (Aibisi™IBISS® rABS) is a high-performance recycled material made from recycled consumer products (including but not limited to home appliances, communication equipment, pipes, plates, electronic appliances, consumer electronics, etc.),through processes such as recycling, sorting pretreatment, cleaning and standardized granulation modification. According to different recycling sources, technical and technological capabilities, and quality management levels, we design classification and screening, technological innovation breakthrough, performance re-optimization and automatic production and processing, and provide extrusion-grade and injection-grade ™IBISS®rABS particles for customers. The company covers different sources of emulsion method and bulk method, and can provide different colors including but not limited to true color, black, gray, white and so on. It can meet the different application requirements of customers in the industry, and at the same time, it can provide all-round customized system solutions and innovations according to customers' special requirements. ™IBISS® rABS &FreeCBO2® ("zero" carbon) products that can provide customers with "zero" carbon.

◎ PCR Polyethylene Terephthalate (TC-Rester®rPET) is a high-performance recycled material (TC-Rester®) based on the recycled drinking water bottles after consumption, which is made by recycling, sorting pretreatment, cleaning and standardized granulation modification.

rPET). According to different recycling sources, recycling methods and quality grades, we design classification and screening, technological innovation breakthrough, performance re-optimization and high-quality automatic production and processing, and provide customers with TC-Rester®rPET products of extrusion grade, casting film grade, two-way film grade, blow molding grade and injection molding grade, covering low-viscosity, medium-viscosity, high-viscosity and other product brands. The products meet RoHS/ REACH standard, and pass GRS/TUVL/UL2908/SCS Global certification, some products pass FDA test. At the same time, we can provide customers with Oceancycle®product series of OBP recycling and OP recycling, and jointly set up Ocean Partner®to promote the green plan of ocean circulation. It can meet the different application requirements of customers in the industry, and at the same time, it can provide all-round customized system solutions and innovations according to customers' special requirements. Tc-Rester®RPET, Ocean Cycle®, Ocean Pet®& Free CBO2®("zero" carbon) products are available.

◎ PCR nylon ®Nairong® rPA6 is a high-performance recycled material®Nairong®rPA6), which is based on the recovered fishing nets, automobiles, low-voltage electrical appliances, etc. after recycling, sorting pretreatment, cleaning and standardized granulation modification. The recycled nylon 66®Nairong®rPA66) is a high-performance recycled material®Nairong®rPA6), which is made by recycling, sorting pretreatment, cleaning and standardized granulation modification. The appearance of Nairong®RPA6 product series is mainly natural color, green and black. Nairong®RPA6 can provide customized products such as Oceancycle®, which can meet the requirements of injection molding, modification processing, tele spinning, extrusion and so on. At the same time, we can provide all-round customized system solutions and innovative solutions according to customers' special requirements, and we can also provide Oceancycle® & FreeCBO2® ("zero" carbon) products.

Recycled polycarbonate (rPC)

Recycled polyacrylonitrile-butadiene-styrene (rABS)

Regenerated polyethylene terephthalate (rPET)

Recycled nylon 6(rPA6)

Beijing Jaran Hydrogen Energy Technology Co., LTD.

Technical field:

Hydrogen Energy and Fuel Cell

Application technology:

Modular Directional Purification

Company profile:

◎ Jaran Hydrogen integrates R&D, design, production and operation. Its business covers industries such as hydrogen energy, carbon capture, gas separation, hydrogen energy vehicle accessories, etc. It has 15 patents, 5 copyrights and 12 commercial marks. Jaran is backed by the scientific research background of Peking University and Tsinghua, Relying on team members' 40-year research experience in adsorption and catalytic materials And 20 years of experience in gas adsorption engineering design and construction. Based on the formulation and production of more than 30 kinds of adsorption catalytic materials, the self-developed technologies and equipment such as MDP industrial hydrogen purification, MDP fuel hydrogen modular directional impurity removal, MDP low-energy carbon capture, MDP gas refining and recovery, and HOGE hydrogen eliminator assembly have been popularized in the industry, and have been widely recognized by customers.

◎ Jaran Hydrogen Source takes "pursuing a win-win situation with customers, shareholders, employees and society, and devoting itself to creating clean energy and serving economic and social development with core technology" as its mission. It strives to become an excellent enterprise that "gathers talents from all over the world and contributes to the progress and development of human beings and society with innovative ways".

Jiang Feng, Founder of Jaran Hydrogen Source

Technical introduction:

◎ MDP modular directional impurity removal technology invented by Jaran Hydrogen includes functional modules such as "MDP-D", "MDP-PSA", "MDP-TSA" and "MDP-HD". Through the organic combination of various modules, MDP technology can be applied to the economical and efficient treatment of various complex gas sources. This gas treatment advantage of low energy consumption and high yield makes MDP® widely used in hydrogen transportation, hydrogen power generation and other scenes that need to treat high-quality hydrogen economically.

- MDP® modular directional impurity removal technology can be applied in the fields of hydrogen transportation, hydrogen refueling stations, traditional industrial hydrogen, green hydrogen purification, hydrogen power generation, carbon capture and utilization, gas purification and recovery, etc.

◎ At present, the most economical and convenient way of hydrogen transportation is gaseous transportation by high-pressure long-tube trailer. Before the fuel is filled into the vehicle, it has to go through the main links such as preparation and compression in the hydrogen production plant, transportation by high-pressure long-tube car, storage and compression in the hydrogen refueling station, etc. Every link will have the risk of re-contamination of the fuel hydrogen. Trace impurities or toxic and harmful impurities of the contaminated hydrogen will remain in pipelines, valves, long-tube cars, compressors and other equipment. These impurities will not only damage the stack of the fuel cell vehicle, but also damage various expensive pressurizing and filling equipment in the hydrogen refueling station.

- In view of the present situation of hydrogen consumption risk in hydrogen refueling stations, Jaran Hydrogen Source has developed hydrogen filtration product ®(HyClean based on MDP® technology, which can be used not only for hydrogen filtration in the last meter of hydrogen refueling stations, but also for various high-pressure hydrogen.

Gas terminal applications, such as fuel cell testing laboratory, large-scale high-quality hydrogen receiving station, etc. ®(HyClean is generally installed at the unloading place of long-tube trucks, which can provide high-quality hydrogen for users by deeply filtering and purifying the purchased hydrogen with trace impurities.

◎ During the operation of the fuel cell system, the utilization rate of hydrogen is as high as 95%, but there are still underutilized hydrogen that will be safely discharged to the atmosphere below 4% after circulation and mixing. When people use a large number of fuel cells to generate electricity in a closed space, the tail hydrogen discharged by the cells will form layered accumulation at the top of the closed space, and after a large amount of tail hydrogen accumulates and concentrates at the top, there will be a safety risk of hydrogen deflagration in the closed space, especially in our common use scenarios such as private cars, warehouse forklifts, tunnel cars and indoor backup generators. It is very important to eliminate the tail hydrogen safely and properly.

- According to the characteristics of hydrogen emission from fuel cell system, Jiahydrogen Source has customized and developed a series of HOGE hydrogen-containing tail gas consuming assemblies for fuel cell systems with different power. According to the customer's requirements, the assembly can include various functions such as pulse airflow distribution, dehydration, heat recovery, hydrogen elimination, noise reduction, etc., so as to realize the efficient and mild reaction between hydrogen and oxygen in normal or low temperature environment, and the reaction product is only water, which is environmentally friendly and safe.

Modular directional impurity removal-hydrogen mother station

Hydrogen-containing tail gas absorption -HOGE

Early Stage

GRST Holdings Limited

Technical field:

Energy Storage Technology

Application technology:

Water Based Manufacturing, Recycling, Regeneration and Reuse Processes for Lithium-ion Battery

Company profile:

◎ GRST was established in 2015, and the team successfully overcame the technical problems of using all-water process to manufacture lithium-ion batteries. The traditional production method of using water as a medium to replace toxic organic solvents makes the production of lithium batteries cheaper and cleaner.

◎ The founder, Mr. Kong Yuan, has been actively promoting cleaner and more environmentally-friendly chemical applications and chemical industries. Together with Dr. He Jinbiao, an electrochemical expert with many years of experience in the field of batteries, he confirmed the technical feasibility of manufacturing high-performance lithium batteries by water-based process, through long-term tests. They together promoted the development of GRST environmentally-friendly green lithium battery technology.

◎ GRST established the first pilot production line with production-grade equipment at the end of 2018 to verify that the technology has the capacity of mass production. In the past three years, GRST has produced more than 58,000 flexible battery cells and more than 190 battery packs, which have been tested internally and provided to customers and potential users in different fields for various scenarios. In 2021, GRST officially launched a large-scale production plan and jointly built a GWh super battery factory in Zhejiang Province, China. The factory will be put into operation in September 2022, and it is planned to expand to 5GWh by 2027.

Kong Yuan, Co-founder and CEO of GRST Holdings

Technical introduction:

◎ Driven by the demand of new energy vehicles, energy storage, and various electric tools, the lithium battery market is growing rapidly. However, the current battery production process uses toxic and high energy consumption chemicals. The larger-scale lithium battery production will face the sustainability challenge, no matter from the environmental point of view or the manufacturing cost.

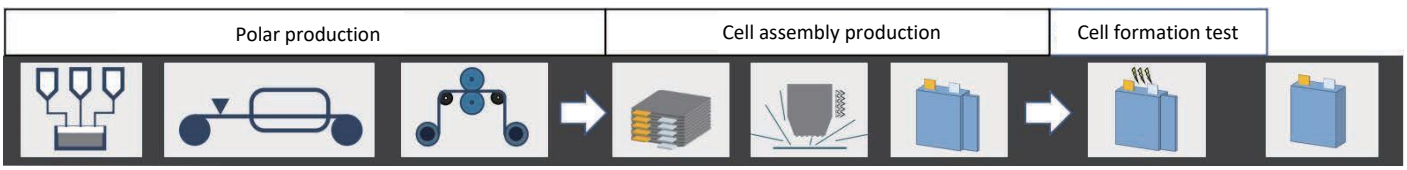
◎ The main technology of GRST is named WATMAR³, which means water-based manufacturing, recycling, regeneration and reuse. The manufacturing method at the battery production end is improved to reduce the production cost and carbon emissions, so as to promote the recycling of lithium batteries in a more environmentally friendly and low-cost way.

◎ In the production of lithium batteries, pole piece manufacturing is the key process. Traditionally, the active electrode material and binder (PVdF) are mixed and pulped with organic solvent (NMP). Then evenly coated on the metal conductive foil, and dried to make the pole piece. However, NMP, as a toxic solvent, needs special equipment for comprehensive absorption treatment. On the other hand, its boiling point is high, and it needs high-temperature drying equipment for treatment, which leads to high energy consumption. As a fluorine-containing binder, PVdF can only be used in conjunction with NMP. In the future, when the battery is exposed to high temperature or broken, will produce

harmful fluorine-containing gas will be generated and difficult to recover. The production process of lithium battery composed of NMP/PVdF has sustainability problems in terms of employee hazards, additional capital investment (NMP control equipment), material price fluctuation (PVdF price has increased by more than 400% in the last 6 months), carbon emissions and potential environmental supervision.

◎ GRST WATMAR³ technology, by using water-soluble binder + water system, replaces the existing slurry system of NMP/PVdF to produce positive and negative pole pieces of lithium batteries, This solution solves a series of problems in the process of manufacturing lithium batteries with water-based system. While achieving lower cost and clean production, the product performance reaches the mainstream or better level of traditional lithium batteries.

6-40Ah soft package battery core



Lithium battery cell production

Luoyang Weida Petrochemical Engineering Co.,LTD

Technical field:

Energy Saving Technology

Application technology:

The Cold Regenerated Catalyst Cycling (CRC) Technology for Oil Refining Sector

Company profile:

◎ Luoyang Veida Petrochemical Engineering Co., Ltd. was founded in 2008, located in Luoyang High-tech Development Zone. It is a joint-stock high-tech enterprise integrating advanced technology and high-quality service, with a group of first-class petrochemical technicians and senior experts and a realistic and efficient management system.

◎ Luoyang Veida has been committed to "clean energy and green chemical industry" for a long time. They mainly engaged in process research, technology development, engineering and technical services in the fields of petroleum refining and chemical industry, energy saving and low carbon, environmental protection, etc., and has passed the certification of GB/T19001 quality management system, GB/T24001 environmental management system and GB/T28001 occupational health and safety management system.

Li Qunzhu, Founder of Luoyang Veida

◎ Luoyang Veida takes "leading science and technology" as its enterprise development tenet, adopts various forms such as technology transfer and technology shareholding, and owns more than 70 FCC and MTO patents, of which 19 CRC core patents (2 PCT US patents, 7 China inventions and 12 utility models) have been authorized. Its independently developed cold regenerant recycling technology (CRC technology) is superior to similar technologies in terms of technical and economic indicators, and is at the international level. As a professional FCC technology provider, the company pays special attention to the market promotion and industrial application of new technologies. So far, CRC technology has been successfully applied to 22 industrial units, achieving both technical and economic benefits.

◎ The company is mainly engaged in process research, technology development, technology transfer, engineering design and technical services in the field of petrochemical industry. It has Grade B qualification in chemical, petrochemical and pharmaceutical industries (chemical engineering, oil refining engineering, storage and transportation of petroleum and chemical products).

Technical introduction:

◎ CRC technology has scientifically solved the worldwide technical problem of the contradiction between regeneration temperature, reaction temperature, catalyst-oil ratio and feed temperature, which is common in current catalytic cracking (FCC) technology. A temperature-controlled regenerant cooling system has been put forward and designed, which has realized a new path of riser reaction for the first time, optimized control of reaction temperature and reaction depth, truly realized carbonium ion reaction, and promoted the conversion of sulfide and nitride. At the same time, the feed temperature is increased, and the atomization effect is improved, so that the yield of light oil is increased, the yield of dry gas and coke is reduced, the energy consumption of the device, the emission of flue gas and the concentration of sulfide and nitride in it are reduced.

◎ After more than ten years of continuous improvement, CRC technology has achieved breakthroughs in basic theory, experimental research and industrial application. CRC technology has led the development direction of catalytic cracking technology, and its popularization and application will realize the low-carbon production of 7/16 catalytic cracking unit, which will largely improve the level of energy conservation, emission reduction and cleaner production in refining and chemical industry in China and even in the world

◎ At present, a series of CRC complete sets of technologies and equipment have been formed, which are not only suitable for new installations, but also for the renovation of existing installations, and have met the conditions for large-scale promotion to domestic and foreign markets. Its popularization and application will make great contributions to carbon emission reduction and carbon neutralization in the global petrochemical industry, and drive the third revolution of FCC technology worldwide, with the intangible assets worth billions of dollars.

◎ For an industrial plant with a processing capacity of 1 million tons/year, the annual CO_2 emission will be reduced by about 70,000-110,000 tons, and the annual benefit will be increased by 1.66 yuan (excluding the benefit of CO_2 emission reduction), and the payback period will be less than 3 months. CRC has the advantages of high technical safety and reliability, good economic benefit, energy saving and emission reduction, low carbon and high efficiency. It also has the advantages of short renovation period, low investment, flexible and simple operation, etc. It can be carried out during overhaul, and is suitable not only for newly-built units, but also for the renovation of existing FCC units, so it has strong market competitiveness.

CRC Technology

Shanghai Maxtropy Data Technology Co.,Ltd.

Technical field:

Carbon Dioxide and Related Greenhouse Gas Emission Management

Application technology:

Smart Industrial Energy and Carbon Management System

Company profile:

◎ Maxtropy Data Technology is a vigorous and enterprising team composed of academicians of Chinese Academy of Sciences, internationally renowned artificial intelligence experts, top Internet of Things experts and former senior executives of international head enterprises.

◎ Maxtropy Data Technology takes professional energy management and intelligent microgrid as the breakthrough point, takes industrial and energy Internet technology as the starting point to lead technological innovation, and actively assumes the role of government policy and industrial change promoter. Maxtropy firmly believes that the flowers of data and intelligence will bloom in all industries, and the comprehensive energy technology based on data and intelligence will bring green value to the whole society, and will also enable mankind to truly have a sustainable future.

◎ Maxtropy Data Technology provides turnkey solutions for new energy systems for industrial enterprises, industrial parks and other customers. A package of solutions based on energy system construction, energy data collection, cloud platform of energy equipment, intelligent analysis and optimization decision-making and control based on artificial intelligence have helped a large number of enterprises and park customers in many regions realize digital transformation, global optimization and green zero-carbon substitution of energy systems.

Liu Hongbo, General Manager of Maxtropy Data Technology

◎ Since its establishment seven years ago, Maxtropy Data Technology has successfully served thousands of customers in industrial parks and industrial enterprises, connecting nearly one million devices. The intelligent energy algorithm engine based on independent intellectual property rights has achieved the highest optimization efficiency of 29.4% for a single customer's energy system. In total, it has achieved the goal of increasing the value of energy system by hundreds of millions of yuan and reducing carbon by millions of tons for all customers.

Technical introduction:

◎ Based on years of industry experience, Maxtropy Data Technology has accumulated a large number of core technical capabilities and intellectual property rights in energy data collection and analysis, optimization algorithm and control system. Based on the comprehensive energy technology enabled by artificial intelligence, Maxtropy provides turnkey solutions of new energy systems for industrial enterprises, industrial parks and other customers. A package of solutions based on energy system construction, energy data collection, cloud platform of the Internet of Things for energy equipment, intelligent analysis and optimization decision-making and control based on artificial intelligence have helped a large number of enterprises and park customers in many regions to realize digital transformation, global optimization and green zero-carbon substitution of energy systems.

◎ Maxtropy global energy and carbon management platform consists of global green energy infrastructure and intelligent energy and carbon scheduling capability based on UES (Global Energy Topology Intelligent Scheduling) technology.

◎ The platform adopts the cloud-edge integrated technology architecture, and through integrating the capabilities of new energy generation, energy storage system regulation, energy load monitoring and user-side main equipment running status monitoring, it opens up the global energy network link from the perception to the business; At the same time, through docking and importing external third-party systems, actively obtaining external data related to electricity and carbon market, environment, weather, supply, production plan and other data, it integrates real-time perception and analysis of electricity supply, production/operation load, new energy generation and energy storage system, HVAC system and external policy change. Then the platform will export the

trends and

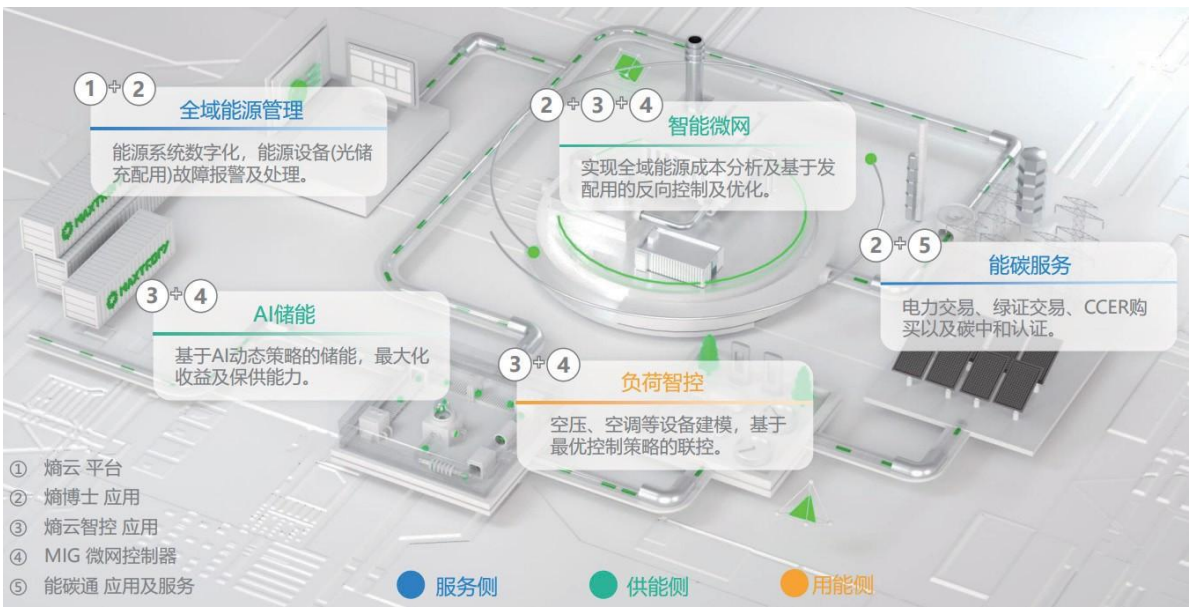
forecasts of various energy consumption and carbon emissions of industrial entities, and dynamically calculate the optimal energy and carbon control strategy through multiple solutions, so as to realize the optimization of energy efficiency and maximize the operating income of energy technology facilities.

◎ Maxtropy carbon management platform has three characteristics:

- Based on ISO15001 governance system and ISO14064 idea, through data acquisition and external system data access, customers' enterprises and parks can be divided into energy/carbon emission operation management units. By establishing a global energy management model, the energy consumption and carbon emission can be counted by management unit, and a traceable portrait of energy and carbon emission can be established. So as to provide customers with real-time self-carbon verification and evaluation ability, energy consumption baseline setting/calculation of energy consumption units and current/historical energy consumption level evaluation, and realize scientific energy/carbon monitoring and governance.

- Based on the design of global energy network topology, it can fully access and monitor the real-time data of energy and power such as electricity, water, steam, industrial gas and compressed air, so as to realize the comprehensive monitoring of enterprise energy consumption and carbon emissions, not just the monitoring of single type of energy consumption and corresponding carbon emissions.

- Through the unique structure definition method of Maxtropy independent innovation and based on global energy network topology, UES scheduling system capability composed of central AI intelligent scheduling system and distributed local intelligent control and regulation system. The AI intelligent dispatching system consists of a central forecasting system and a central strategic dispatching system. The central forecasting system can fully integrate the historical energy/carbon curve of enterprises, the forecast of new energy generation, the production plan of enterprises, the baseline of energy consumption of enterprises, etc., and accurately forecast the energy consumption, carbon emissions and new energy generation of enterprises. The core of the central strategic dispatching system is the AI algorithm model with multi-objective comprehensive adjustment capability. The central control strategy can be generated based on multiple objectives such as energy consumption, energy cost, carbon emission, etc., and the strategy can be dynamically adjusted in real time according to the changes of related energy consumption and environmental parameters. The central strategy uniformly coordinates the distributed local strategy system to adjust the high energy consumption adjustable load, flexible load, energy storage system, etc. in real time, so as to achieve the purpose of energy and carbon optimal regulation covering the real source network load storage.



One-stop landing of factory-level global smart energy carbon system

Zhongding Hengsheng Gas Equipment (Wuhu) Co., Ltd

Technical field:

Hydrogen Energy and Fuel Cell

Application technology:

Diaphragm Compressor

Company profile:

◎ Zhongding Hengsheng Gas Equipment (Wuhu) Co., Ltd. was established in 2008. The company's core business is independent research and development, design, production and sales of diaphragm compressors, and it is a leading provider of comprehensive compressed air system solutions in China.

◎ The company has become an important equipment supplier for world-famous energy and chemical enterprises such as PetroChina, Sinopec, National Energy Investment Group, Wanhua Chemical, etc. by virtue of its leading diaphragm compressor manufacturing technology and high-quality comprehensive service capability. The company is constantly expanding its service scope and customer influence.

◎ Diaphragm compressors produced by this company have high quality, such as no leakage of compressed media, no pollution to compressed media, easy realization of ultrahigh pressure, etc. The products are widely used in petrochemical industry, industrial gas, aerospace military industry, medical research, new energy and other fields. Driven by major favorable policies such as low carbon goal and demonstration urban agglomeration, the company has gradually grown into an important equipment supplier in the hydrogen energy industry, and developed industry-leading hydrogen filling compressors and hydrogen refueling station compressors.

Luo Kachin, Founder of Zhongding Hengsheng

Technical introduction:

◎ Diaphragm compressor is a reciprocating positive displacement compressor, and its transmission part works like a piston compressor. The crankshaft rotates to drive the connecting rod to swing to form the reciprocating motion of the piston, so that the oil pressure in the closed oil cylinder rises and falls, and the diaphragm is pushed by the oil pressure to form periodic pressurization.

◎ Diaphragm compressor is a kind of displacement compressor with special structure. The cylinder does not need lubrication, and the sealing performance is very good. The compression medium does not contact with any lubricant, so the diaphragm compressor can compress the gas with extremely high purity, generally reaching 99.999% purity.

◎ Diaphragm compressors are widely used in the fields of petrochemical industry, industrial gas, aerospace military industry, medical research, new energy, etc. because of their characteristics of no leakage of compressed media, no pollution to compressed media and easy realization of ultrahigh pressure.

◎ Diaphragm compressor has the following advantages:

- As the cylinder of diaphragm compressor is composed of dome-shaped oil cylinder and cylinder, which are separated by metal diaphragm, the gas pressurization process will not be polluted by the lubricating oil of moving parts, and the gas purity can be well guaranteed.
- The working cavity of the cylinder is composed of diaphragm and the cambered surface of the cylinder head, which is statically sealed, with no gas leakage and can easily reach high pressure.
- The transmission part is compressed hydraulic oil, so the equipment has low vibration and noise.
- There are few vulnerable parts, mainly diaphragms. The follow-up maintenance operation cost is low.

Diaphragm Compressor

Beijing Fenergy Technology Co., Ltd.

Technical field:

Hydrogen Energy and Fuel Cell

Application technology:

Hydrogen Fuel Cell Catalyst, MEA and Stack

Company profile:

◎ Beijing Fenergy Technology Co., Ltd. is an innovative enterprise that integrates R&D, production and sales of hydrogen fuel cells and core components with a full set of independent intellectual property rights, has obtained the transfer and authorization of many core patents of Tsinghua University Hydrogen Fuel Cell Laboratory in the field of fuel cells, and undertakes its industrialization task. It has built R&D centers and production bases in Beijing, Zhejiang, Sichuan and other places, covering an area of over 15,000 square meters. The products have been listed in the 14th Five-Year Plan of Zhejiang Province, and are the leading enterprises of electric reactors in national hydrogen energy demonstration areas.

Wang Haifeng, Founder of Fenergy Technology

◎ Fenergy Hydrogen Energy Team includes 3 key project leaders of the Ministry of Science and Technology at the national level and 2 provincial-level high-end talents. It has undertaken about 20 national 973/863 and other key R&D programs, and has more than 20 years of experience in the hydrogen fuel cell industry. Fenergy also won the provincial leading innovation and entrepreneurship team, provincial enterprise R&D institutions and Jiaxing leading innovation and entrepreneurship team. Fenergy 's hydrogen fuel cell products have "all independent intellectual property rights" and "all-round cost control" in the fields of fuel cells and core components. The core performance index "volume power density" of the graphite bipolar plate hydrogen fuel stack that has been mass-produced reaches 4.0kW/L, and the volume power density of the metal bipolar plate stack is 5.5kW/L, which leads the industry in comprehensive life. The products have been equipped with complete vehicles and put into use in Zhejiang, Guangzhou, Sichuan, Chongqing and other places, and the mileage of a single vehicle exceeds 30,000 kilometers. In the field of power generation, Fenergy has developed a variety of products, which can be used for abandoned power generation, cogeneration, emergency scenarios such as power supply. Fenergy has accumulated more than 120 fuel cell patents, including 100 invention patents.

Technical introduction:

◎ The Lakepower series pure hydrogen fuel cell system developed by Fenergy is suitable for the power station scene, and the hydrogen utilization efficiency is up to.95%, with zero carbon emission in the whole process, producing water, heat and electricity, which can effectively reduce carbon and emissions while bringing high-efficiency output.

◎ Features:

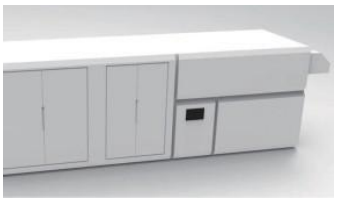
- The power of Lakepower series products can be expanded from 10KW to 2MW, which can meet different demands.
- The Lakepower series power station products independently developed by Fenergy have an adaptive control system, which allows the products to automatically adjust when facing different altitudes, environmental pressures and temperatures, so as to ensure that the products are in the best operating state.
- The core components are Lucifer 2.8, the latest series of membrane electrode independently developed by front source hydrogen energy, with a power density of 1.8w/cm^2.
- FYC-2 series metal bipolar plate coating of fuel cell adopts three-layer coating design technology, and its conductivity and corrosion resistance are 80% better than those of the industry.
- The FY06 water-cooled graphite reactor dedicated to the internal distribution station can produce water, heat and electric energy, and the comprehensive efficiency of the product is as high as 95%.
- The modular design of the power station can be placed, transported and operated at any time. According to the use intensity, an overhaul and maintenance will be carried out from March to June.

◎ Lakepower10

Rated power	10kW
Outline dimension	1050×715×470mm
System voltage	48V
System current	0~250A
Designed life	20000h

◎ Lakepower100

Rated power	100kW
Outline dimension	3800×2400×2400mm
System voltage	600V
System current	0~200A
Designed life	20000h



◎ Lakepower200

Rated power	200kW
Outline dimension	4500×1880×2250mm
System voltage	600V
System current	0~200A
Designed life	20000h

◎ Shudu Bus-8.5m Fuel Cell City Bus

Fuel cell power	65kW
Overall dimensions of vehicles	8500×2500×3380mm
Total vehicle mass	13800kg
Maximum vehicle speed	69km/h
Vehicle cruising range	550km
Location and quantity	Chengdu /20 sets

◎ Xiamen Jinlong-10.5m Fuel Cell City Bus

Fuel cell power	81kW
Overall dimensions of vehicles	10500×2550×3400mm
Total vehicle mass	18000kg
Maximum vehicle speed	69km/h
Vehicle cruising range	800km
Location and quantity	Jiaxing /25 Taiwan

◎ Deli Automobile -49-ton fuel cell semi-trailer tractor

Fuel cell power	110kW
Overall dimensions of vehicles	7470×2550×3540mm
Total vehicle mass	25000kg
Maximum vehicle speed	85km/h
Vehicle cruising range	450km
Location and quantity	Anyang /100 units in Henan

Nanjing Joes Future Food Technology Co., Ltd

Technical field:

Low-carbon Biotechnology and Others

Application technology:

Cultured Meat Creation and Core Technology

Company profile:

◎ Joes Future Company, founded in 2019, is located in Nanjing National Agricultural High-tech Industry Demonstration Zone-the first batch in China and the only national agricultural high-tech zone in the Yangtze River Delta. Professor Zhou Guanghong of Nanjing Agricultural University, the chief scientist of the company and academician of the International Academy of Food Sciences, focused on the innovative research and development of future food, mainly engaged in the development and large-scale production of cell culture meat. Since 2009, research on myogenic differentiation of stem cells has been carried out. In 2015-2017, high-purity porcine muscle stem cells and bovine muscle stem cells were isolated for the first time. In 2017- 2019, a new method for maintaining the dryness of porcine and bovine muscle stem cells in vitro was established. In 2019, a technology system for the production of cultured meat was established, serum-free culture conditions containing 10 cofactors were developed, and a mold for the production of cultured meat containing microcolumn arrays was invented. In November, 2019. The company is committed to building the first R&D platform for large-scale production of cell-cultured meat in China, so as to realize meat production at cell level. The company's main business is research and development of cell culture meat technology and product development. At present, the main product is cell culture meat products. The company has accumulated more than ten years of cell culture meat technology and the ability and resources of the whole industry chain covering basic research, industrialization, and supervision. At present, it has received the accumulated investment of more than 70 million yuan from well-known investment institutions, and is committed to building the first research and development platform for large-scale production of cell culture meat in China, so as to realize the meat production at the cell level.

Ding Shijie, Co-founder and & CEO of Joes

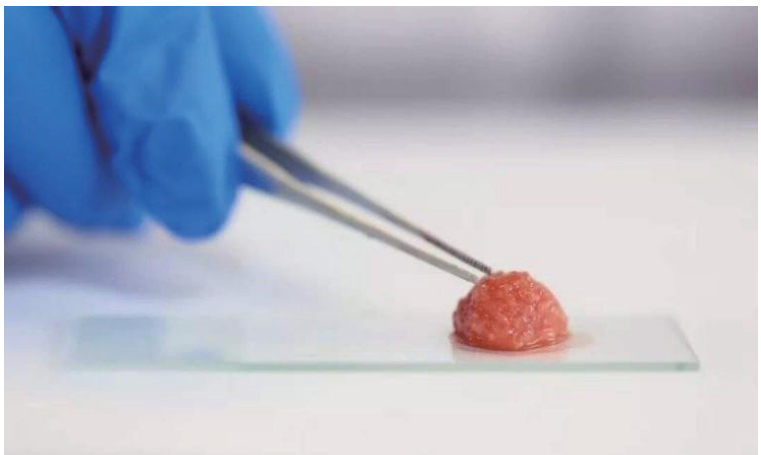
Technical introduction:

◎ Joes Future is deeply involved in the research and production of cell culture meat in the future, and has made breakthroughs in seed cell extraction and dryness maintenance, cell suspension amplification production, serum-free medium development and product development.

- Research and development platform of whole industry chain: The company has established the first research and development platform of whole industry chain production of cell culture meat in China.
- Seed cell separation and preparation: establish a seed cell bank, separate and screen to obtain high-purity seed cells, and reserve a variety of seed cells such as muscle, fat and smooth muscle of pigs, chickens and cattle.
- Serum-free culture medium technology: to build a serum-free culture medium development platform, and to develop a variety of low-cost culture media with definite ingredients without animal serum.
- Carrier-free suspension culture technology: a complete set of single cell suspension culture domestication methods was established, and the breakthrough progress was made from carrier suspension to carrier-free suspension.
- Scale-up production technology research: The stable operation of cell culture in a 5L to 100 L bioreactor has been realized, leading the domestic cell culture.

The meat industry has entered the stage of 100-upgrade bioreactor testing and production, and can obtain kilogram-level cell culture meat in a single week. After optimization in the future, it can reach the level of 100 kilograms in a single week.

- Core product development: A series of cell culture meat products that meet the dietary characteristics of Chinese have been developed, including cell culture pork belly, lean meat, pig skin, fat, etc. Research and develop muscle and fat cultured meat products with low-cost scaffolds, and promote the establishment of a delicious, safe, healthy and sustainable future food system.



Schematic diagram of experimental products of cultured meat (November 18th, 2019)

Cultured pork belly, lean meat, pig skin, fat and other products (2022.06.10)

Lanzhou Lanshi Zhongke Nanotechnology Co., Ltd.

Technical field:

Disposal and Recycling of Wastes

Application technology:

Industrial Hazardous Solid Waste Recycling and High-value Reuse Technology with Bubble Liquid Membrane Method as the Core

Company profile:

◎ Lanzhou Lanshi Zhongke Nanotechnology Co., Ltd., a second-level subsidiary of Lanshi Group, was established on October 8, 2019. It is a high-tech, light-asset, technology-export-oriented enterprise established by Lanzhou Lanshi Group Co., Ltd., Lanzhou Institute of Chemical Physics, China Academy of Sciences, and the patent holder team. The company owns the core patented equipment and technology with independent intellectual property rights, which can prepare a variety of micro-and nano-materials on an industrial scale at normal temperature and pressure. The technological process is simple and low in energy consumption, which is of extraordinary value to traditional chemical enterprises' industrial upgrading and product quality improvement. Relying on the powerful equipment R&D, design and manufacturing capability of Lanshi Group and the solid foundation of Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, which is leading the country in R&D, testing and application of high-end functional nanomaterials, the company is committed to the development, application research and industrialization promotion of nano-material production equipment and technology. At present, the company's main business involves R&D, manufacturing, sales, authorized use of nanomaterial manufacturing equipment and the construction of equipment R&D cooperation platform; Construction of micro/nano material production, sales, process development and micro/nano material application R&D cooperation platform; Operation and cooperation of related intellectual property rights; Consulting and technical services.

Kang Xiangjing, Founder of Lan Zhongke

Technical introduction:

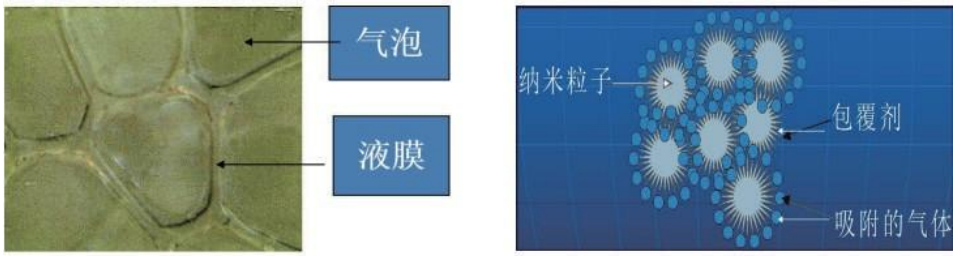
◎ The core technology of Lanshi Zhongke is the recovery and high-value reuse technology of industrial hazardous solid waste with bubble liquid membrane. The company produces all kinds of nanomaterials through the high-value utilization of solid wastes, and the raw materials used are all solid wastes generated in the original storage and production process of the enterprise. Through the original industrial technology route and patent technology of Lanshi Zhongke, the solid wastes are converted into high-value nanomaterials.

◎ The product produced by this technology is a multifunctional new inorganic material, and its particle size is about 1 ~ 100 nm. Due to the refinement of crystal grains, their surface electronic structure and crystal structure change, resulting in the characteristics of surface effect, volume effect, quantum size effect, macroscopic tunnel effect, high transparency, high dispersion, etc. that macroscopic objects do not have. In practical application, it can reduce the amount and increase efficiency, and the performance indexes of similar products are improved.

◎ Compared with the existing products, the raw materials of this technical route mainly come from industrial solid wastes, so the price is low, and the produced products have a greater cost advantage than similar products in the existing market. At the same time, this product uses industrial solid wastes as raw materials, and the carbon emission and pollution emission of the product's whole life cycle are far less than those of the existing products. Compared with the existing products, the production technology route of the product is more optimized, and the energy consumption is greatly improved. Therefore, under the background of two-carbon strategy, this product has obvious advantages in carbon emission and pollution emission compared with similar products in the market.

The core products of the company are micro-nano materials prepared by bubble liquid membrane method. Through bubble liquid membrane method and bubble liquid membrane reactor, more than 20 kinds of products such as magnesium hydroxide, magnesium aluminum hydrotalcite, zinc oxide, Ferrous lithium phosphate, ferroferric oxide, copper oxide, aluminum oxide and cerium oxide have been produced. Among them, magnesium hydroxide, magnesium aluminum hydrotalcite, etc. have been industrialized in large quantities. At the beginning of 2021, the company passed Embedded in the core nano-reactor, the industrialization demonstration line of nano-ZnO was built, the trial production of 1,000 tons of nano-ZnO was completed, and 200 tons of basic zinc carbonate, the precursor of nano-ZnO, was successfully produced. The core key indicators were far superior to nano-oxidation.

The national standard of zinc has reached the expected effect of industrialization of scientific and technological achievements of new nano materials. In September 2022, the first trial production of a 1500-ton nano-Ferrous lithium phosphate cathode material demonstration project was successful. In the same month, the company successfully prepared nanometer zinc oxide products suitable for feed grade applications by combining bubble liquid membrane method with hydrothermal method.



Schematic diagram of bubble film method

Expansion Stage

Beijing Shougang LanzaTech Technology Co., Ltd.

Technical field:

Carbon Capture, Utilization and Storage Technology

Application technology:

Ethanol and Protein Production from Carbon Containing Industrial Off Gas via Biosynthetic Technology

Company profile:

◎ Beijing Shougang LanzaTech Technology Co., Ltd. was established in November 2011. It is a Sino-foreign joint venture high-tech enterprise controlled by the Shougang Group, a pilot of mixed ownership reform in Beijing, and a national "specialized and innovative" little giant enterprise. The company adopts the gas biological carbon fixation integration technology independently researched and developed, and directly converts industrial tail gas containing CO and CO_2 into high-value products such as bioethanol and new feed protein, thus achieving a breakthrough in the technology of biosynthesis of protein and ethanol from one-carbon gas. Ethanol is not only added to gasoline as clean energy, but also used as a basic chemical raw material for deep processing into green low-carbon products such as ethylene, aviation kerosene, cleaning products, cosmetic packaging materials, clothing fabrics, etc. The developed new feed protein won the first new product certificate of feed raw materials in China, and was rated as "2021 China Agricultural and Rural Major New Products, New Technologies, New Equipment-New Products", realizing the independence, self-reliance and self-improvement of the industry. It can be replaced and stored, and can get rid of the dependence on imported soybean, fish meal and other traditional protein feed sources, thus solving the problem of "bottleneck" of protein resources in China.

Chao Wei, Vice President of Shougang Langze

Technical introduction:

◎ LanzaTech is committed to bio-fermentation synthesis of bioethanol and new feed protein (Clostridium alcoholicum protein) by using one carbon gas (CO/CO_2 in industrial tail gas resources. This technology uses Clostridium alcoholicum as fermentation strain and CO in industrial tail gas such as steel, ferroalloy, calcium carbide and phosphorus chemical industry as raw materials. After gas pretreatment, fermentation, distillation and dehydration, protein extraction, sewage treatment and other technological processes, fuel ethanol and bacterial protein were produced, inorganic carbon was directly converted into organic carbon, and carbon fixation and CO_2 emission reduction were realized.

◎ This technology takes the fermentation process as the core. According to the raw material requirements and product characteristics of gas fermentation technology, the upstream and downstream supporting processes are studied to form a system integration process technology, to achieve continuous fermentation operation stability and performance improvement. Including six key technologies:

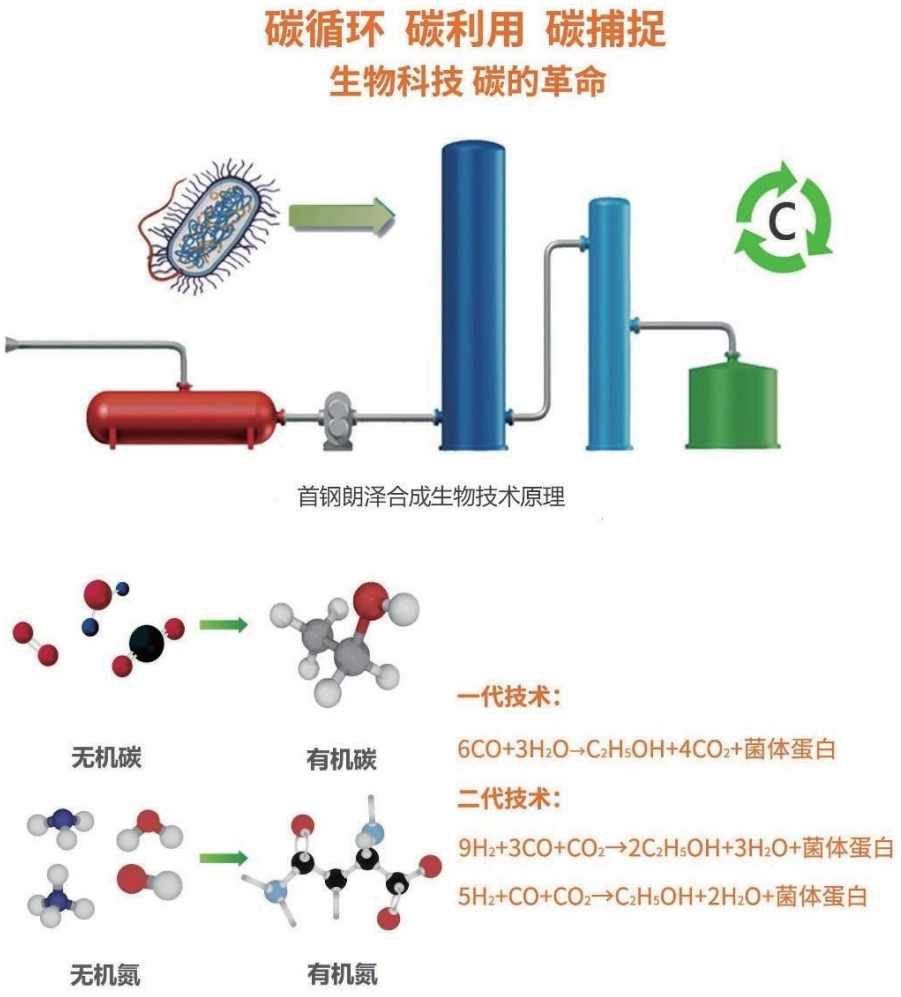
- Gas pretreatment process
- Efficient fermentation process
- Distillation dehydration process
- New concentration and drying process of bacterial protein

- Tail gas treatment and heat energy recovery process
- Sewage treatment process

◎ LanzaTech has experienced many years of pilot research and development since 2011, breaking through various technical barriers from laboratory research to commercial application, and forming a complete and feasible process technology integration scheme for the first time. In May 2018 and May 2019, respectively, the world's first industrial plant with an annual output of 45,000 tons of fuel ethanol steel/ferroalloy was built in Tangshan City, Hebei Province and Shizuishan City, Ningxia, and operated stably.

◎ The core products of LanzaTech are bioethanol and new feed protein.

- Bio-ethanol produced by the company can be added to gasoline as non-food liquid fuel, effectively reducing the emission of automobile exhaust pollutants. At the same time, it can be used as a basic chemical raw material. After deep processing, it can be made into diversified low-carbon products such as ethylene, cleaning products, packaging materials, clothing and so on, thus realizing carbon solidification.
- As a high-quality protein raw material, the company's new feed protein has obtained the first new feeding bucket product certificate of New China issued by the Ministry of Agriculture and Rural Affairs, which is of great significance to get rid of the dependence on imported soybean and other traditional protein feed sources, and alleviate the shortage of protein resources in China, and has become a "big country" for the country's major strategic needs. The new feed protein has excellent animal nutrition and feed processing characteristics, such as high protein (≥80%), high digestibility (> 90%), balanced amino acid composition, high viscosity, high swelling degree, etc. It is rich in small molecular functional substances, which are beneficial to animal intestinal health and can replace fish meal and soybean meal. It is a high-quality protein raw material.



Schematic diagram of synthetic biology principle of LanzaTech

ZHONG-CHU-GUO-NENG (BEIJING) TECHNOLOGY CO.,LTD.

Technical field:

Energy Storage Technology

Application technology:

100MW Advanced CAES System

Company profile:

◎ ZHONG-CHU-GUO-NENG (BEIJING) TECHNOLOGY CO.,LTD.. is the pioneer and leader of advanced compressed air energy storage system. As a national high-tech enterprise and a cutting-edge technology enterprise in Zhongguancun, it is in an international leading position in the field of long-term and large-scale compressed air energy storage, and has a complete set of capabilities in research and development, design, core equipment manufacturing, engineering implementation, and power station investment and operation of 100 MW advanced compressed air energy storage system. The company's technology originated from the Institute of Engineering Thermophysics, Chinese Academy of Sciences, and its technical team has established the "National Energy Large-scale Physical Energy Storage Technology Research and Development Center", with a 1-300MW advanced compressed air energy storage component experiment and system integration test and development platform. It has successively completed the construction of a number of national key demonstration projects such as 1.5MW in Langfang, Guizhou Bijie 10MW, Shandong Feicheng 10MW and Zhangjiakou 100MW in Hebei, and is accelerating the industrialization of 100 MW advanced compressed air energy storage technology, which has been built and under construction.

Discipline of General Manager of ZHONG-CHU-GUO-NENG

Technical introduction:

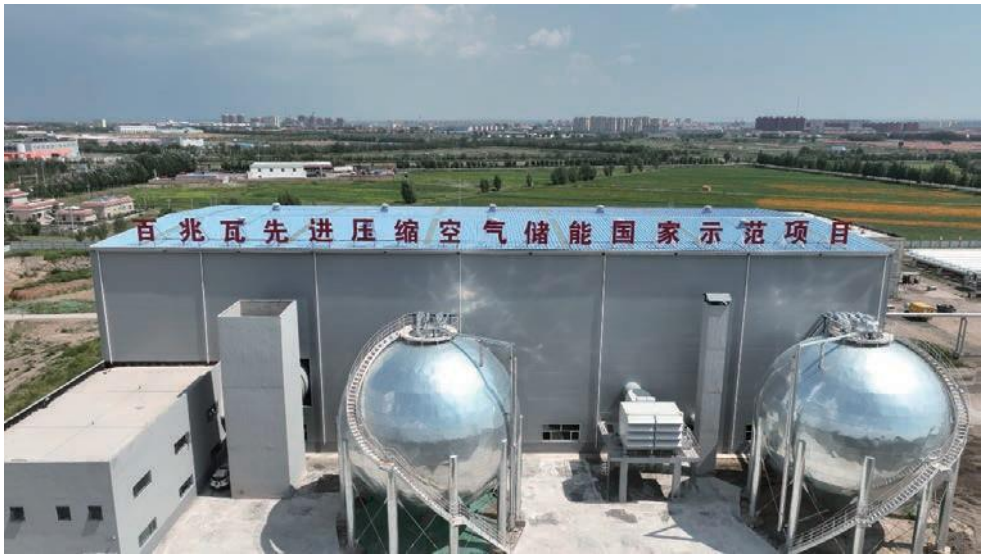
◎ Compressed air energy storage technology has the advantages of large scale, low cost, long service life, cleanness, no pollution, good safety, etc. It is a long-term and large-scale energy storage technology with great development potential. It can realize many functions such as peak regulation, frequency modulation, phase modulation, rotating standby, black start, etc. It has broad development space and strong competitiveness in improving the efficiency, safety and economy of the power system, and is an important supporting technology for building a new power system and realizing the dual-carbon goal.

◎ After 18 years of technical precipitation and innovation, the R&D team has mastered a complete set of core technologies of the 100MW class system with completely independent intellectual property rights. In 2020, Zhangjiakou international first set of 100MW advanced compressed air energy storage national demonstration project was built. In 2021, it was completed and commissioned in December, 2002. It was successfully connected to the grid in September, 2022, and the core equipment autonomy rate was 100%. It can generate more than 132 million kWh of electricity every year, and can provide power protection for about 50,000 users at peak power consumption.

◎ Product advantages:

- Not restricted by geographical conditions: storage tanks or artificial chambers can be used for gas storage, which does not depend on large natural gas storage caves and is not restricted by geographical conditions.
- No need to burn fuel: heat storage equipment is used to store and recover the compressed heat in the air compression process, so it is no longer necessary to burn fuel to provide heat source in the power generation process.
- High energy storage efficiency: the electric-electric design efficiency of 100 MW system underrated working conditions can reach 70%, which is about 10%-20% higher than other compressed air energy storage power stations at home and abroad.

- Low unit cost: the cost of the 100 MW system after industrialization is about 4,000-7,000 yuan /kW or 800-1,200 yuan /kWh, which is equivalent to the unit cost of pumped storage system and lower than other energy storage technologies.
- Long life of the system: the life of the system is 30-50 years.
- Environmentally friendly: This energy storage system does not involve the combustion of fossil fuels and does not emit any harmful substances.
- Comprehensive energy supply: the excess heat and cold energy generated by system operation can realize comprehensive energy supply, and at the same time, industrial waste heat can be recovered and reused.



Field equipment diagram of compressed air energy storage system of the company

Beijing Bluepha Microbiology Technology Co., Ltd.

Technical field:

Green Degradable Material

Application technology:

Biological Fermentation Technology Using Carbon Dioxide and Conventional Biomass as Dual-carbon Sources

Company profile:

◎ Beijing Bluepha Microbiology Technology Co., Ltd was established in October, 2016. It is a national high-tech enterprise that innovates molecules and materials based on synthetic biotechnology. The core team of the company comes from top scientific research institutes such as Qinghua University, Peking University, Chinese Academy of Sciences and Fortune 500 companies, and the expert consultant team is composed of leading figures in the field of synthetic biotechnology in Industry-University-Research. Bluepha is committed to designing, developing, manufacturing and selling new bio-based molecules and materials, including the bio-material blue pigment ™PHA which can be completely degraded spontaneously in all natural environments, functional beverage ingredients which can effectively relieve anxiety, new functional probiotics which can compensate common metabolic defects of human body, functional ingredients of medical beauty and beauty circuit, etc., thus helping B-end head customers in many industries such as consumer goods, medical care, agricultural environmental protection, electronics and electrical industry to carry out differentiated competition. As of January 2022, Bluepha has successively completed the financing with a total amount of over RMB 1.5 billion, and the investors include many well-known institutions in China. The company has R&D centers and offices in Beijing, Shenzhen, Shanghai and Yancheng, Jiangsu, and its customers and partners include many Fortune 500 companies from food and consumer goods industries.

Bai Yuanbin, Founding Partner of Bluepha

Technical introduction:

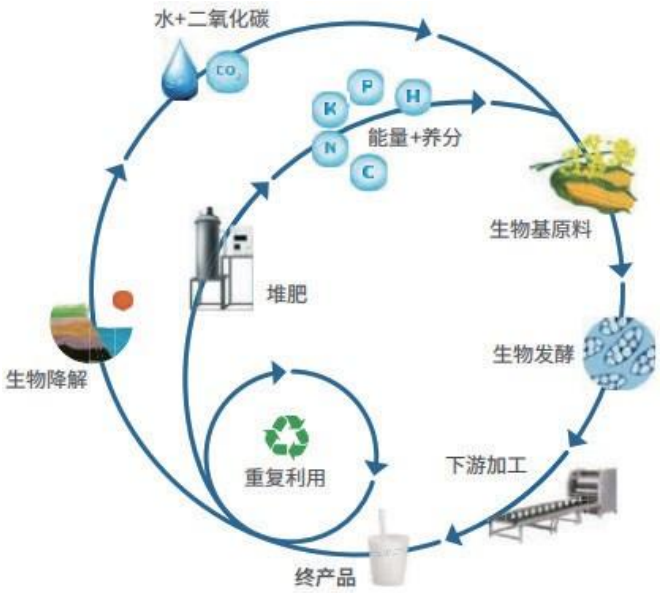
◎ Marine degradable plastic blue pigment™PHA (polyhydroxy fatty acid ester) is the first product pipeline of blue crystal microorganism, and it is also the first product of industrialization. Blue™PHA is a new material synthesized by natural microorganisms. It has a green and low-carbon life cycle and its performance is no less than that of traditional petrochemical plastics. European and American countries have adopted increasingly stringent regulatory policies for petroleum-based plastics used in packaging and consumer goods, while the blue pigment™PHA is a bioplastic that can spontaneously degrade in soil, fresh water and seawater. 506 PHA has passed the marine degradation test of international authoritative certification bodies.

◎ Cyanin™PHA is biosynthesized and can be completely degraded into water and carbon dioxide in soil and marine environment. The experimental verification shows that the degradation period of Cyanin™PHA is shorter than 6 months. Blue Crystal Microbe has developed the industrial production technology of PHA, a biodegradable material, which has solved the problems of high production cost, low output and unstable product performance of PHA for many years, and systematically reduced the production cost of ™PHA.

◎ In addition, Bluepha is one of the few companies in China that have passed the European Union's requirements for testing food contact materials in PHA field, and it has a positive leading and exemplary role in breaking foreign monopoly and promoting sustainable development of green economy. At the same time, Bluepha is carrying out strategic cooperation with many partners in major countries and regions in the world to continuously expand the global market of PHA and provide cleaner, low-carbon and environmentally-friendly green materials for global consumers.

◎ In addition to PHA, Bluepha has stocked dozens of new molecular and material product R&D pipelines around regenerative medical materials and beauty cosmetics.

New functional ingredients, new food additives, engineering probiotics and other application directions will rapidly promote the research and development of new products, explore new paths in business models, and build an innovative ecology that grows together with partners. Each molecule and material corresponds to a direct market size of over $1 billion.



Schematic diagram of production material life cycle of the company

HOREN CORTP Co.,Ltd.

Technical field:

Low-emission Transportation Logistics Technology

Application technology:

Packaging as a Service

Company profile:

◎ HOREN is an intelligent recycling packaging technology and service provider for global manufacturing enterprises, providing packaging recycling and sharing solutions for users in various industries. The company aims to make the packaging cycle as convenient as water and electricity, take ESG concept as the strategic cornerstone, promote industrial upgrading with technological innovation, build an intelligent recycling packaging design and manufacture, and provide recycling service and management of the whole industry chain Internet platform. With the comprehensive R&D capabilities of logistics packaging, Internet of Things, integration of software and hardware, and innovative technologies such as one box and one yard, co-management of boxes and goods, and AI-assisted decision-making, box sharing provides full-link digitization capabilities from off-site PaaS recycling box service to on-site SaaS recycling management for industries such as bulk liquid, fresh food, cold chain, new energy vehicles, spare parts, chemicals, household appliances, etc., accelerates the replacement of one-time packaging process, promotes the industrial packaging cycle, and serves the zero-carbon transformation of the manufacturing industry.

Liao Qingxin, Founder of HOREN

◎ As an advocate and practitioner of the concept of zero-carbon recycling, box sharing has overcome the recycling technical problems in industries such as non-hazardous chemicals, fructose syrup, food and beverage, biomedicine, etc. through independent technological innovation, and based on the innovation of digital technology and recycling sharing mode of industrial recycling packaging industry, it has significantly reduced the carbon emissions in the whole life cycle of logistics packaging and accelerated the big cycle of industrial packaging. HOREN innovates the decentralized circulation sharing mode. Use the service outlets covering 100 kilometers of the whole country, through the digital technology platform, to serve the cluster customers in the region, and unify the standards, services and management, to realize the nearest sending and receiving of empty boxes and rent-sharing. Reduce the use of disposable packaging, save packaging costs, and meet different customers' demand plans for boxes in low and peak seasons.

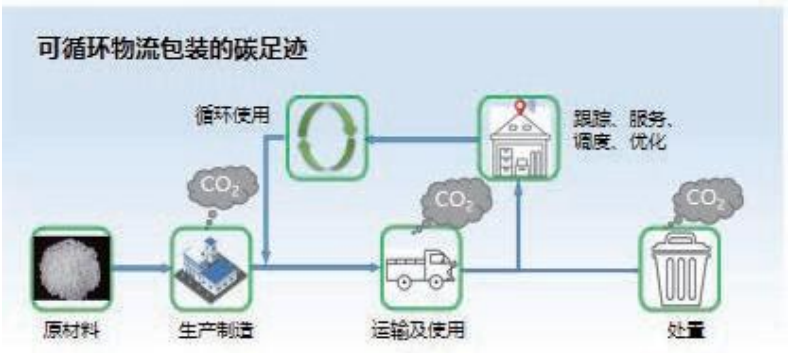
Technical introduction:

◎ HOREN has the closed-loop capability of R&D, design and manufacturing, circular service and digital management of intelligent circular packaging in various industries. The number of patents in the field of circular logistics packaging leads the world. Up to now, China has authorized 103 invention patents, which are developed globally. There are 880 patents.

- Recycling packaging technology: Master the R&D design and manufacturing technology of recycling packaging such as recycling packaging technology, module and process design material modification, and apply for patented technologies of recycling packaging such as thin structure, double smooth surface, disordered folding, zero residue, full diameter, high temperature sterilization, gas-assisted thin wall, wheel brake separation, diamond reinforcement, etc.
- Internet of Things technology: Independent research and development of Internet of Things technologies such as empty and full box identification, ad hoc network launch, intelligent cloud delivery, etc., to achieve full coverage of one box and one yard.
- Digital technology: Build an integrated digital platform covering the front desk, middle desk and back office of users, innovate (PaaS packaging as a service) circular service mode, independently research and develop SaaS circular management platform, and drive the full-link circulation from on-site to off-site with two wheels.

◎ PaaS(Packaging as a Service) circular service deeply integrates digital technology and circular packaging service network, and provides standardized intelligent logistics packaging service for upstream and downstream enterprises in the supply chain with a new "packaging as a service" mode. The whole service is online, which is more efficient, convenient and timely. Users can obtain the box service through online box platform, small programs, WeChat service number and other convenient ways, and share the carbon footprint life cycle assessment of products and carbon emission reduction data of recycling services with customers, thus effectively solving the carbon footprint and carbon accounting data collection capacity of logistics packaging. Empower enterprises to transform their low-carbon supply chains and help the logistics industry to be carbon neutral.

◎ SaaS pipe box service (Software as a Service), intelligent pipe box service. Help asset managers to fully understand the operation status of assets, and effectively control the three cores of asset management, early warning and monitoring, and efficiency optimization. It can sense the location, circulation track, current status (in-transit, empty, full, lost, idle, etc.) of logistics packaging in real time, and realize the whole life cycle management of logistics packaging from production to recycling, covering all-link scenes such as collection, loading, warehousing, delivery, in-transit, transit, unloading, cleaning and maintenance of logistics packaging.



Schematic diagram of carbon footprint of recyclable logistics packaging

Finalist Awards (2022)

Field	Enterprise Name	Declared Technology
CCUS	Clean Carbon (Beijing) Technology Co.,Ltd	CO_2 Mineralization Concrete Technology
Energy Storage Technology	Jiangsu Richpower New Energy Co.,Ltd.	Energy Storage System(ESS) with Artificial Intelligence (AI) safety and operations technology
Disposal and Recycling of Wastes	Beijing VOTO Biotech Co., Ltd	Composting Technology for Organic Solid Waste
	Beijing SINOENC Engineering Technology Co.,Ltd	Efficient Biotransformation Technology of Organic Waste
	Yi Design Company Limited	Ceramic Waste Regeneration
	Shanghai Re-poly Environmental Protection Technology Co., Ltd.	Sustainable Innovation Technology Of High Quality Recycled Plastics
Energy Saving Technology	Beijing Changxin Wanlin Technology Co., Ltd.	MAZ Fuel Detergent Synergist
	WENLING LAVAL NEW ENERGY TECHNOLOGY CO.LTD.	MARINE SHIPS' EXHAUST HEAT-DRIVEN EJCTOR REFRIGERATION TECHNOLOGY
	Xiangyang Solergy Tehnology Company, Limited	Pump-Driven Two-Phase Double-Loop Cooling System for Datacenters
	Guangzhou Hexin Environment Technology CO.,Ltd.	On-line reduction equipment for high-concentration hazardous waste liquid
	Tianjin Aozhan Xingda Chemical Technology Co., Ltd.	Advanced energy saving high performance fractionation technology and column internals
Green Degradable Material	Jiangsu Jinlong-cas Enviromental Protection New Material Co., Ltd.	Utilizing Carbon Dioxide to Produce Poly Propylene Carbonate (PPC) Polyol
Renewable Energy	Inner Mongolia Huameng Kechuang Environmental Protection Technology Engineering Co., LTD.	Multi-material clean utilization of gas, electricity, heating and fertilizer co-production pollution reduction and carbon reduction project
	Beijing Tianhuo Institute of New Energy Technology Co., Ltd.	High Concentration Photovoltaic (HCPV) System
Energy Management System and Technology	Suzhou Boehmer Thermal Products Co., Ltd	Multi energy complementary intelligent energy management system
	Goldginny Engineering Technology(Beijing)Co.,ltd	Expert system for energy-saving optimization control of central air conditioning cold water
	DCTech. Co., Ltd	DC Digital Twin Zero-carbon Smart Park management system
	Getech Technology CO., LTD.	Getech Energy Management System and Carbon Management System
Hydrogen and Fuel Cell	Suzhou Ion-tech Nano Technology Co. , Ltd.	Industrialization project of PVD coating technology and equipment for fuel cell bipolar plate
CO_2 and Related Greenhouse Gas Emission Management	Beijing TerraQuanta Technology Co., Ltd.	Clean Energy Management System
	Beijing Green Inclusive Technology Co., Ltd	"Green Inclusive Cloud ("GIC"): Digital Carbon Account Book"
	Shanghai Eco-Carbon Digital Technology Co., Ltd.	Industrial Manufacturing Carbon Emission Data Quantification Cloud Computing
Low-emission Transportation Logistics Technology	DST Electric Vehicle Rental (Shenzhen) Co., Ltd.	New computing data platform
	Smarto Technology Co., Ltd.	The Carbon-neutral Solution of Package
	G-eDrive (Beijing) Auto Tech.Co., Ltd.	The Key Technology of 2-speed Electric Drive System For New Energy Vehicles
	Yongkang Zhilu Technology Co., LTD	Reusable Packaging
Low-carbon Biotechnology and Other	Hebei Daguang Biotechnology Co., Ltd	Microbial compound technology
	KeFeng Advanced Materials Qingdao Co. LTD	Green Surface Treatment technology for High Performance Abrasion and Corrosion Resistance