Unleash the Potential in Every Particle

Newmatnano
纽姆特纳米科技

Welcome to Newmat

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Company Overview

- Company Profile
- Core Team
- Development History
- Business Distribution
- Vision, Mission, Values

Product Family

- FB-CVD Series
- FB-SDNC Series
- FB-ALD Series
- PE-CVD Series

- Deposition& Coating
- Porous Carbon Activation
- CNTs
- Solid-State Electrolyte

Core Technologies

- Safety-Compliant Design Standards
- Temp Field Control
- Flow Field Control
- Material Manufacturing Process
- Comprehensive Experimental Database
- Customized Design Capability
- Intelligent Control
- Scale-Up Capability

Service & Commitment

- Clients & Partners
- Intellectual Property
- Service System
- International Business
- Business Philosophy

Company Overview

- We are an advanced powder solutions provider, dedicated to creating new value in powder materials.
- We have comprehensive capabilities in designing, manufacturing, installing, and commissioning fluidized bed system, with the vision to be a global leader in powder equipment.
- As a pioneer in LFP coating fluidized bed technology, we offer a complete equipment portfolio from lab scale to mass production.

200+

4

Core Team

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Founder: Han Jing

CEO, Beijing University of Chemical Technology
Background: CATL, Sinochem International, Azure

Expert Team

Academician Jin Yong

Member of the Chinese Academy of Engineering; Dean of the Institute of Chemical Science and Technology, Tsinghua University.
"Fluidization Lifetime Achievement Award".

Professor Yu Hao

Vice Dean, School of Chemistry and Chemical Engineering, South China University of Technology. Ph.D. Supervisor.
Ministry of Education's New Century Excellent Talents Program.

Professor Shang Yuming

Associate Professor, Tsinghua University
Expertise in chemical engineering equipment, materials, and preparation processes

Fluidization Research Team

Dr. Qian Zhen, CTO

CTO
Previous Background: Director of Research Institute, Yitai Group; Council Member, Peking University Ordos Research Institute; Council Member, Inner Mongolia Chemical Association.

Bai Haolong

R&D Manager
Former member of Prof. Wei Fei's research team.
Extensive expertise in fluidization and fluidized beds, .
Inventor of multiple patents.

Technical Team

Liu Kai

VGM
Previous Background: Dongchen Chemical and China Construction Installation.
Extensive experience in chemical production, safety management, and project management.

Luo Xiuwen

VGM
Extensive R&D experience in state-owned enterprises.
Extensive expertise in fluidization and fluidized bed technology.
Inventor of multiple patents.

Ma Xinli

VGM
Extensive R&D experience in state-owned enterprises.
Expert in fluidization and fluidized bed technology.
Inventor of multiple patents.

Materials Team

Wen Meisheng

R&D Expert,
Previously led battery material development at a major automaker.
Expert in new energy battery material systems and manufacturing processes.

History

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2014-2020

Color-changing ink, MWCNT equipment using fluidization.
1st industrial LFP carbon coating FBR.
Company founded

2021

Top battery makers（e.g., ATL, CATL）exploring new Si/C route by using FBCVD for mass production.

2022

1st FBCVD20
1st FBCVD100

2023

1st FBCVD300
1st FBCVD500
Funding received

2024

2nd Funding received
FBCVD1000 R&D and trial
FBCVD500-- mature

2025

1st FBCVD1000
Porous Carbon activation, SWCNT, Solid Electrolyte.

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Products

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Fluidization Tech

FB-CVD

- New Si-Carbon Anode
- Graphite Surface Treatment
- Cathode Coating
- Porous Carbon Activation.
- 3D Print/Alloy/Metal Coating

FB-SDNC

- High-end Graphite Anode
- Cathode Coating
- Industrialized Material Coating

FB-ALD

- Precise Material Coating
- Sodium-ion Battery Material Coating

PE-CVD

SWCNs

Fluidized Bed Chemical Vapor Deposition Reactor (FB-CVD)

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FBCVD-500 （100kg）

FBCVD-100（20kg）

FBCVD-20（3kg）

Typical Process Flow Design of FBCVD

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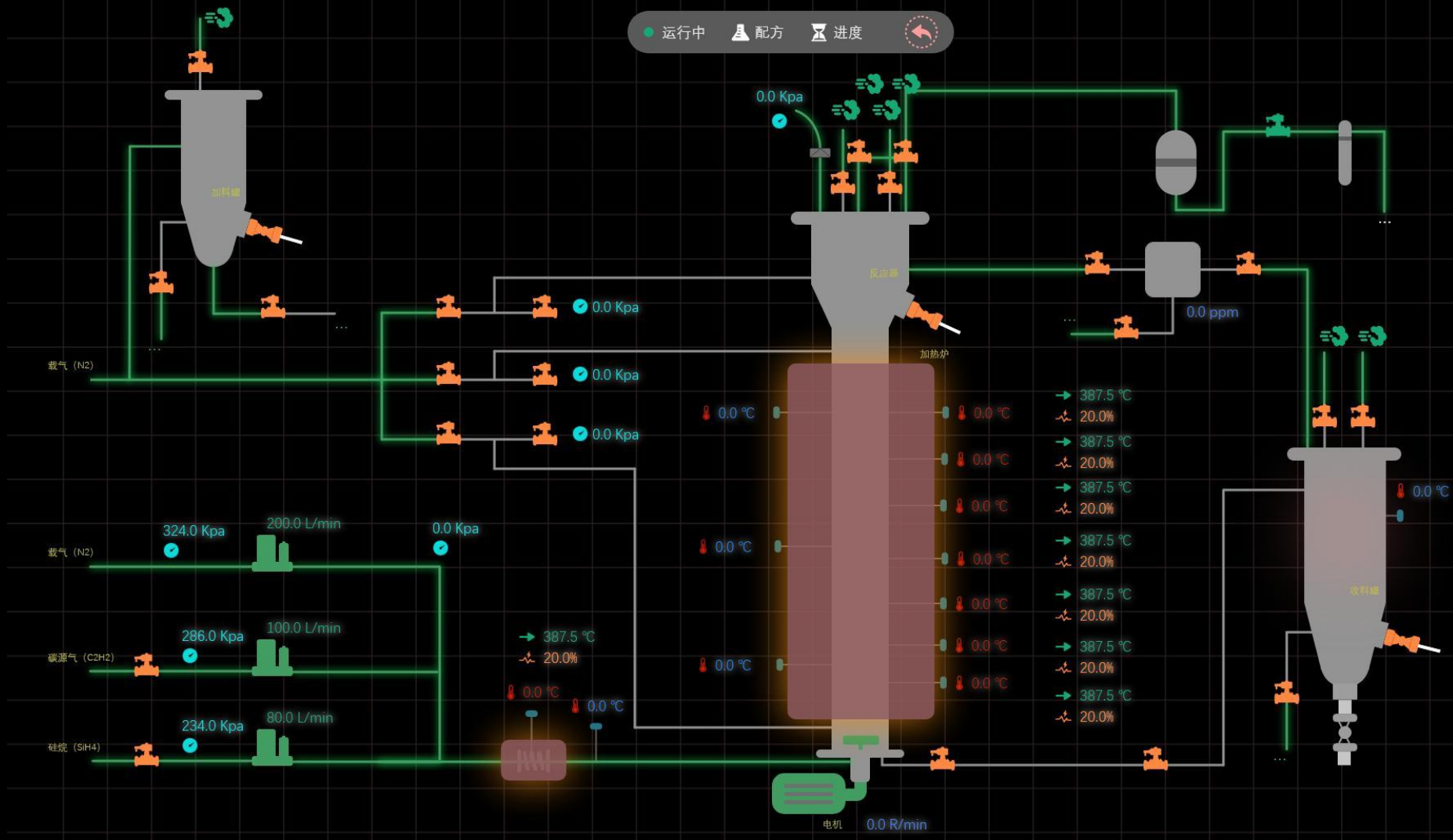

Typical Process Flow Design of FBCVD

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FBCVD Workflow Demonstration

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FBCVD Product Series

Model	Capacity (kg/batch)	Effective volume of reactor (L)	Reactor diameter ⌀ (mm)	Power (kW)	Dimension (L*W*H) mm
FBCVD-1	0.1	1	50	6	1240*670*1770
FBCVD-10	1	10	100	13	3400*900*3100
FBCVD-20	3	20	150	20	4192*950*3112
FBCVD-100	20	100	250	62	6120*2617*5298
FBCVD-300	50	300	350	135	4600*4200*8100
FBCVD-500	**100**	**500**	**400**	**170**	**5750*3790*8685**
FBCVD-1000	**200**	**1000**	**500**	**350**	**4800*9300*11000**
FBCVD-2500S	500	2500	750	600	5000*7200*11500

Si-C: ≤700° C Activation : ≤1000° C Particle size: ≥2μm

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Porous Carbon Activation Equipment

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- Scale-Up Progress: Equipment scaled up to 500-kg scale; ton-scale units under development.
- Key Advantages: 1. Adaptable to various feedstocks. 2. High efficiency with lower cost. 3. Superior product quality from efficient gas-solid heat transfer. 4.Doubled yield and more cost-effectiv vs. conventional methods.

V1.0 V2.0 V3.0 V4.0

China's First Fluidized Bed Activation Equipment

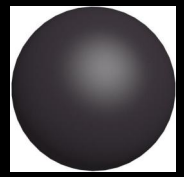
Capacity increased 10 times.

Capacity increased 100 times.

Capacity increased 250 times.

Capacity increased 500 times.

- Critical Control Point



H2O/CO2 activation

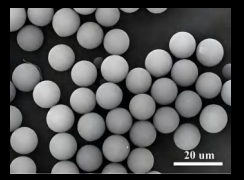
Carbonized carbon

Activated Carbon

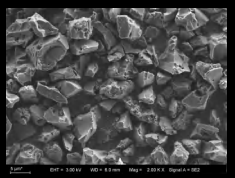
Feedstock Types: Resin carbon, Biomass-carbon, Petroleum coke, Coal tar pitch

BET: 1500~2800 m^2/g

Pore Volume: 0.7~1.2cc/g



Spherical resin



Coconut shell

Technical Features of Newmat Porous Carbon Activation

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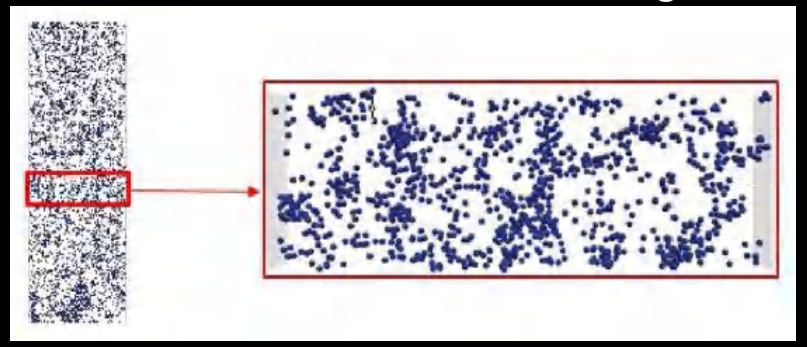
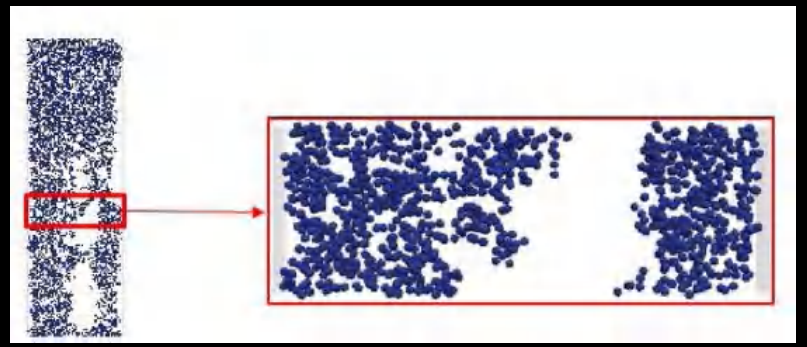
- Core Innovation: Agglomerative Bubbling Fluidization (ABF) to Agglomerative Particulate Fluidization (APF).

  (more uniform and stable bed, better gas-solid contact efficiency).



(ABF)



(APF)

- Core Technical Features: Micro-Jet + Tapered Fluidized Bed

Advantages of the Newmat Activation Reactor:

- Superior fluidization quality
- Smaller particle cluster size
- Excellent scalability
- Micrometer-scale mixing
- Optimized heat transfer performance

- **Activation Yield: 35~45% (spherical resin carbon and biomass carbon).**
- **Energy Consumption: 8000~15000kW*h/t.**
- **Efficiency Enhancement: unique online sampling device significantly improves process adjustment efficiency.**

FBALD Product Series

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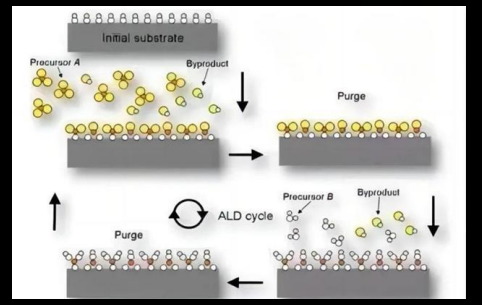
Reaction Mechanism

Active sites (e.g., –OH groups) on the substrate surface allow precursor molecules to form a saturated, monolayer chemisorption. After each cycle, new active sites are exposed, enabling the next cycle to proceed.



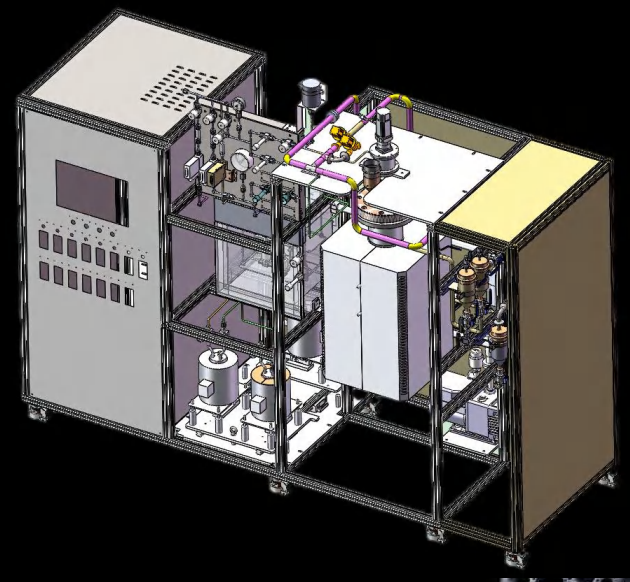
Core Advantages

Exceptional Uniformity: Uniform coating even for complex, porous, or high- aspect- ratio powders.

Å-Level Precision: Film thickness controlled at ångström (Å) scale via reaction cycles.

Superior Batch Consistency: Excellent reproducibility in batch- to- batch production.

Non-Destructive Coating: Gentle vapor-phase process preserves the powder's native structure.



FB-SDNC Product Series

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Fluidized Bed Spray Drying Nano- Coating (FBSDNC) is an advanced process that integrates spray technology with fluidized bed technology

Core Process:

Fluidization & Suspension: Core particles are uniformly suspended in a fluidized bed by an upward gas flow.

Precision Spraying: A coating precursor solution is atomized into micron/nano- scale droplets and evenly sprayed into the fluidized bed.

Instant Coating & Drying: Droplets contact and spread over particle surfaces, drying instantly to form a dense, nanoscale coating layer

Technical Advantage

1. Full Automation	PLC/DCS-controlled process —from feeding and fluidization to spraying and drying.
2. Uniform Coating	Dynamic mixing of fine droplets with fluidized particles.
3. Material Flexibility	Uses soluble/dispersible precursors, not limited to gases.
4. Continuous Production	Hig-capacity continuous operation vs. traditional batch systems.

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Core Challenges in Si/C Preparation Technology

--Runaway risk & product uniformity.

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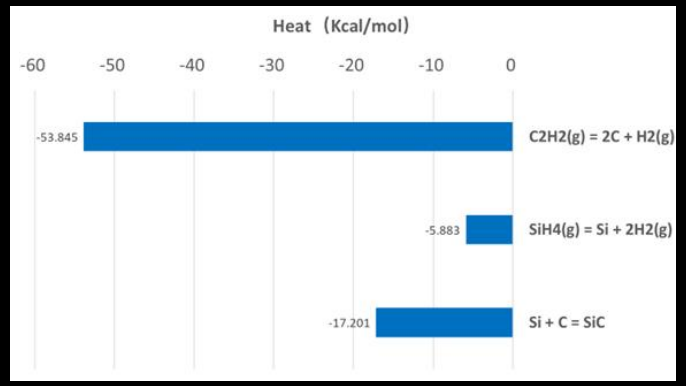
- **Safety Issues:**

Typical Runaway Reaction Chain: Local Accumulation → Hotspot Formation → Component Failure

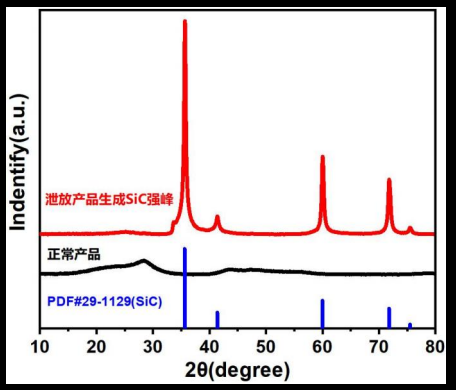
- Silicon buildup on central nuts or reactor walls disrupts thermal/flow fields.
- Agitator burnout from high temperatures reduces mixing efficiency.
- Metal filter clogging with silicon creates local hotspots for silane/acetylene decomposition.
- Equipment bulging or rupture directly threatens personnel and device safety.

Potential Triggers:

- Local Hotspots
- Fluidization Dead Zones / Local Agglomeration
- SiH_x Intermediates
- In-situ SiC Formation Reaction
- H_2 Adsorption Accumulation
- Rapid Acetylene Pyrolysis



Intense Heat Release



SiC Phase Formation

Trigger Scenarios:

- Excessive Silicon Deposition — Forms a “seed bed” that accelerates silane decomposition.
- High-Pressure / Low-Flow Acetylene Decomposition — Initial stage with elevated pressure and insufficient gas velocity.
- Lon-Term Operation Without Cleaning (>15 batches) — increases hotspot probability due to crust/hard lump formation.
- Using Resin-Carbon Feedstock— its high viscosity leads to sticky agglomerates, hindering effective heat removal.

Safety-Compliant Design & Operation Standards

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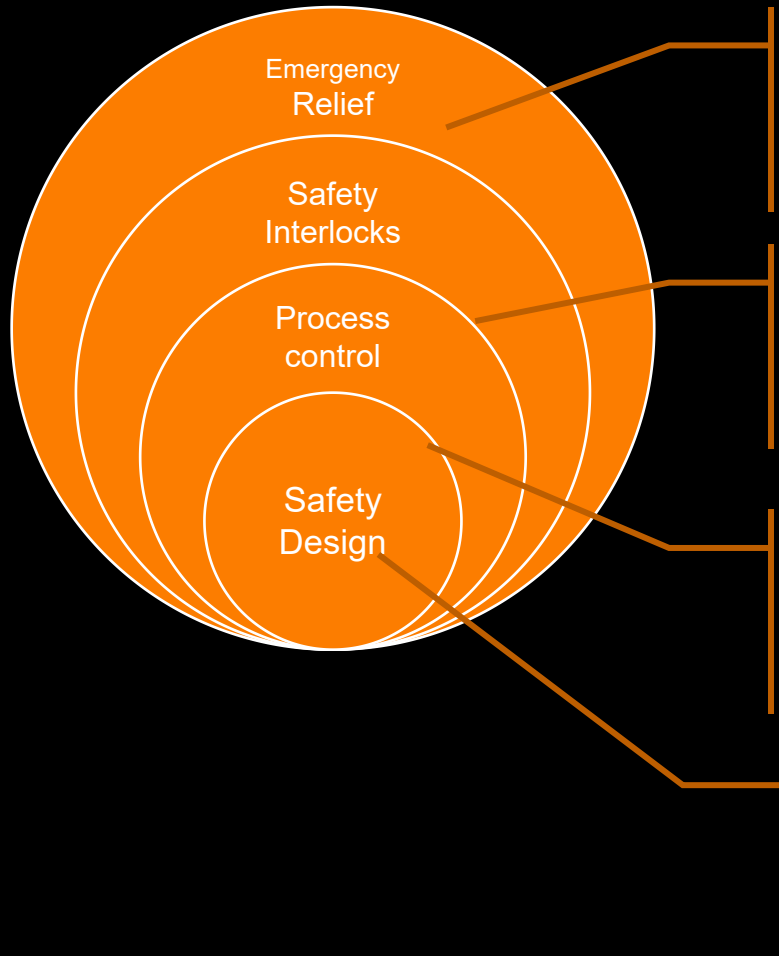

Safety Barriers & Emergency Response:
- Final Barriers: Emergency systems (e.g., bursting discs, safety relief tanks).
- Physical Containment: Blast walls, vent guidance, and remote control.
- System Mitigation: Emergency discharge handling (flare, scrubber)

Independent SIS & Interlocks
Automatically triggers on critical limits (e.g., over-temp, over-pressure, agitator failure).
→ Actions: Emergency shutdown, feed cut- off, quenching

Proactive Warning & Adaptive Control
- Detection & Alarm: Real-time monitoring of temperature, pressure, agitation.
- Auto-control Loops: Execute operating recipes with high- sensitivity response.
- Safety Interlocks: Set strict parameter ranges based on material properties

High-Standard Safety Design
- Working < 0.08MPa, Design 0.4MPa.
- Operating parameters well below safety limits.
- New electric heating design & dedicated reactor internals.

Core Issues in Si-C Preparation Technology (Cont.)

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- **Si-C Product Uniformity:**

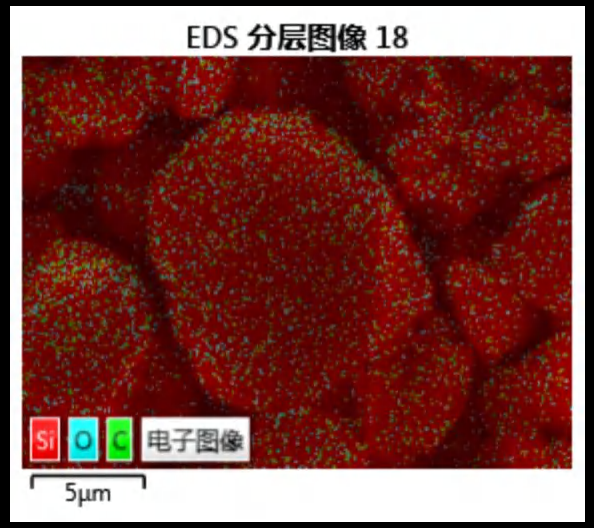
  Inadequate from small/medium reactors for industrial production, worsens with scale-up.

- **Root Cause:**

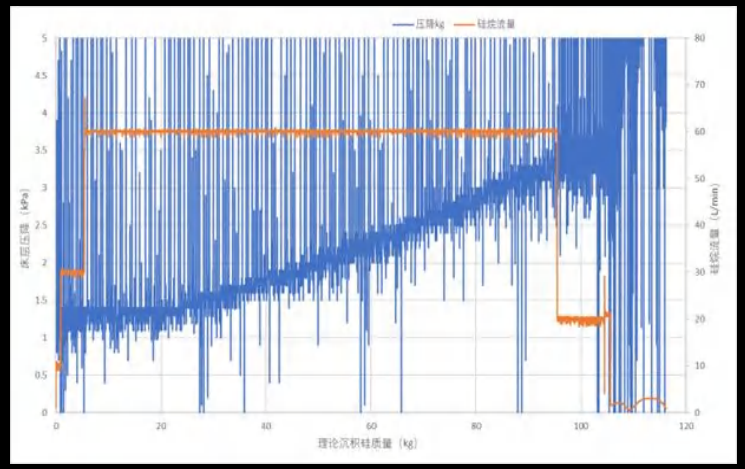
  Root Cause:
  Uneven flow field & uncontrolled temperature field —— uneven gas distribution, dead zones, local hotspots -> varying Si deposition rates.

- **Scale-Up Risk:**

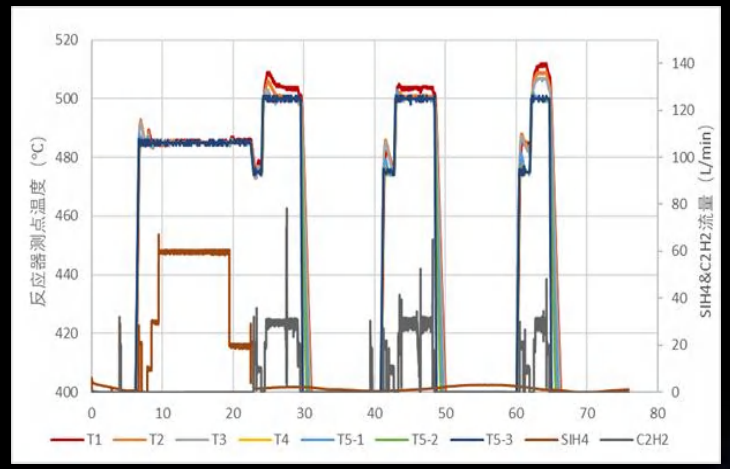
  Maintaining flow/temperature uniformity becomes harder with larger diameters; revolutionary gas distributor design needed.



Uneven silicon deposition



Stratification



Thermal equilibrium failure

Core Design Principles of Si/C Reactors

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- The performance of a Si/C reactor in addressing the dual challenges of runaway reaction risk and product uniformity fundamentally depends on the scientific integration of flow field and thermal field design.
- An advanced Si/C material preparation process necessarily involves three key evolutions: raw material modification, customized reactor design, and process optimization.

Flow Field Design

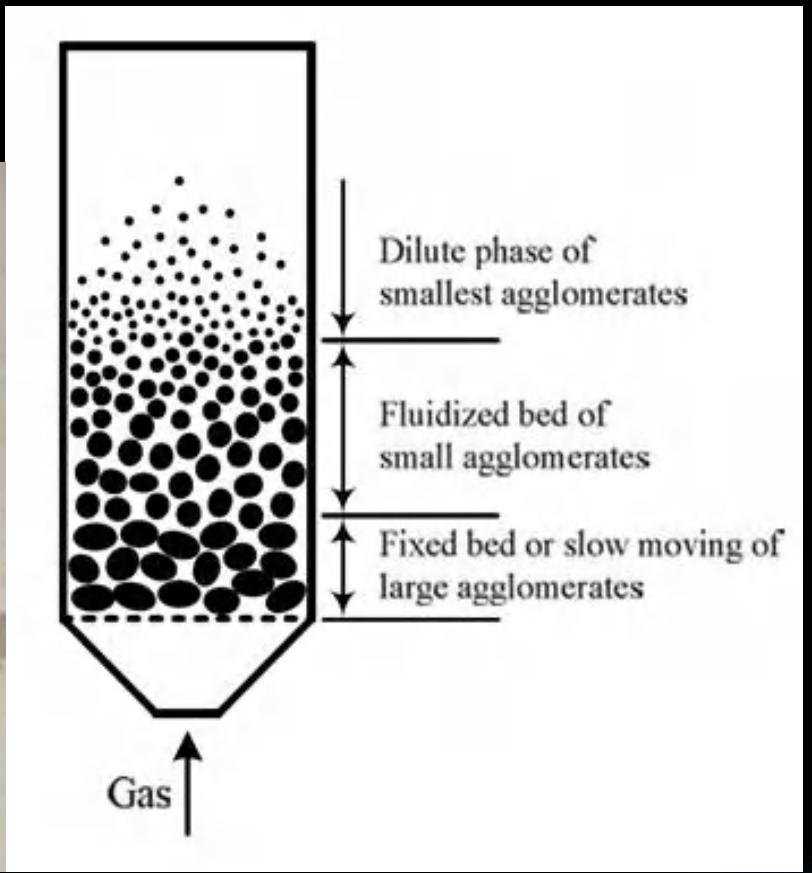
- High-efficiency gas distributor
- Optimized agitator design
- Reactor diameter transition structure
- Operating gas velocity matched to particle properties

Thermal Field Design

- Multi-zone temperature control
- Intelligent electric heating with preheating and holding stages
- Rapid response tailored to reaction heat release characteristics

Key Features of Advanced Si/C Reactor Development

- Advanced internal component design
- Cold-flow fluidization validation
- Fundamental mechanism studies
- Comprehensive system functionality
- Targeted process optimization
- Validation of safety and product uniformity



Experimental Database

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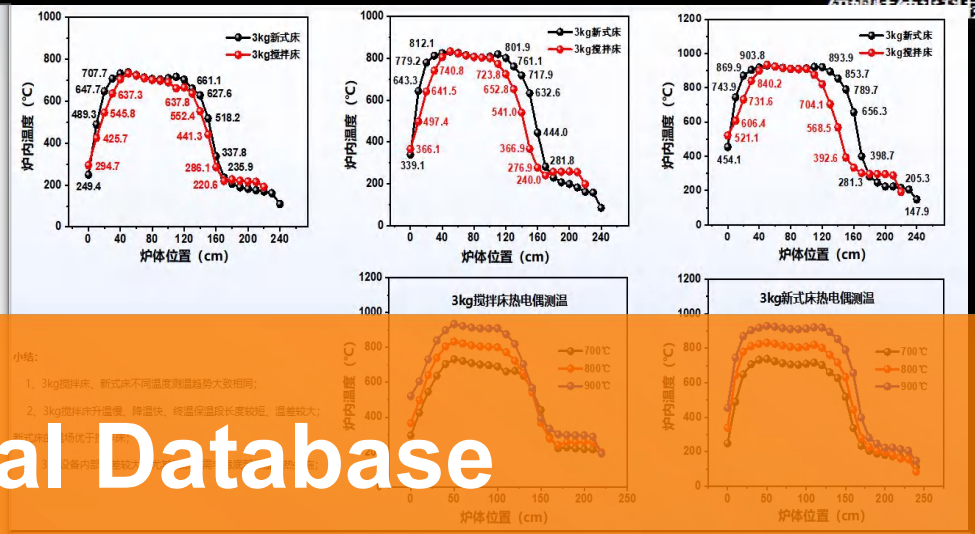
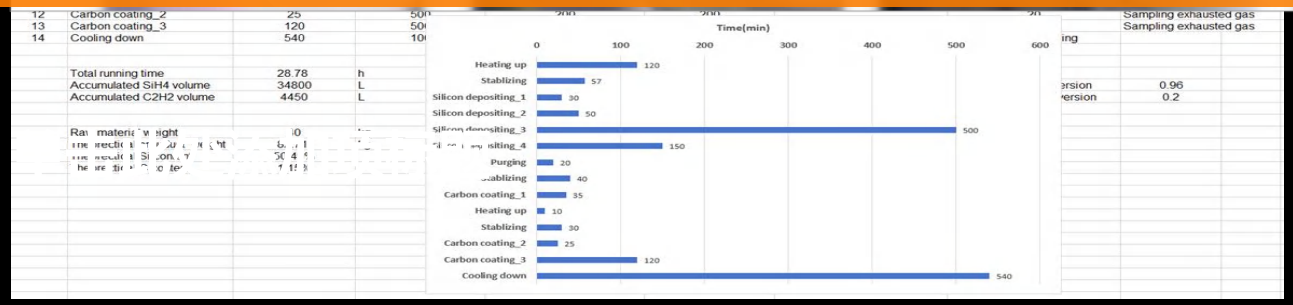
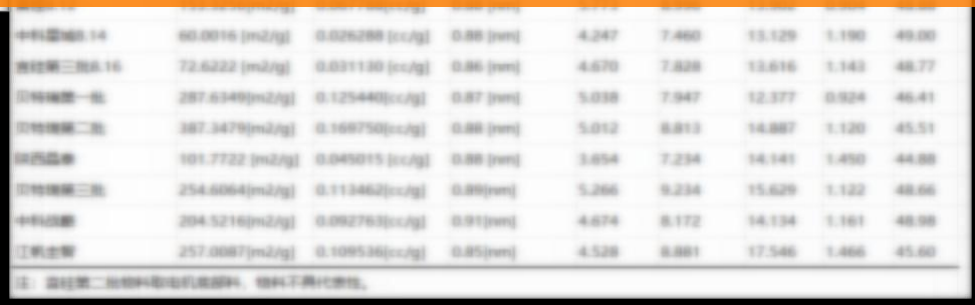


Comprehensive Experimental Database

- Tailored R&D and Validation: Conduct fundamental research and process verification to meet specific client needs.
- Multi-Feedstock Process Research: Comprehensive study of activation and silicon-carbon preparation processes for various raw materials, including resin carbon, coal pitch carbon, and biomass carbon.
- Advanced Process Technology Development: Including fluidized bed processes for solid electrolytes, floating catalyst CNT synthesis, ALD equipment and process development, and plasma carbon coating technology.





Industrial Scale-Up Solutions

- **Gradual Scale-Up of Fluidized Bed Reactors**
- **Planning for K-ton Si-C production lines**

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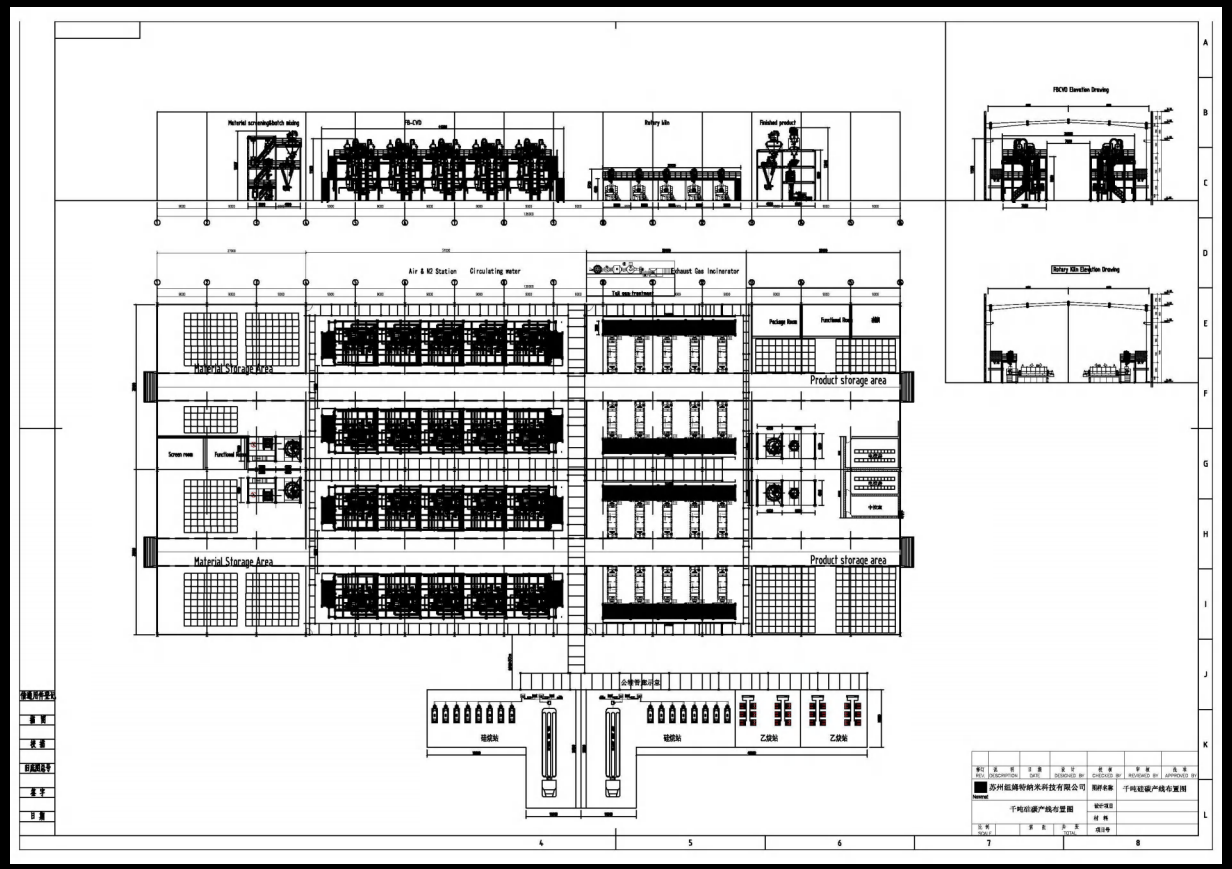

- 1. Si-C reactor: max. 300kg/Annual capacity: 300 units (100kg)/Full-process design: Fluidized Bed + Rotary Kiln
- 2. Porous-carbon activation reactor: max.500kg/ 1000kg coming soon

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Partners

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BTR
CATL 宁德时代
CONE 碳一
圣泉集团 SQ GROUP
KAIJIN 凯金
IOPSILION
杉杉 Shanshan
石大胜华 SHIDA SHENGHUA
璞泰来 PUTAILAI
FULI 富理
ECH 洗霸
国轩高科 GUOXUAN HIGH-TECH
尚太科技 SHANGTAITECH
中宁硅业 SILICON
XtalPi 晶泰科技
SoLid 索理德科技
弘康 HON KANG
Liton 立探新能源
物科金硅
SHINZOM
iAmetal
AMT 星汉纳米
FROM NATURE FOR THE NATURE
金龙羽
协鑫 GCL
能·研

Service System

Industry's Largest Service Team

Over 40 specialists with 5+ years of experience

Full support: installation, trials, training, upgrades

Standardized Workflow

Needs → Design → Testing → Installation → After-sales

Ensuring quality & efficiency at every step.

Value-Added Services

Material testing & validation

Secure data & process optimization

Helping you achieve greater business value

Intellectual Property

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As of June 2025: 17 invention patents granted and 21 patent applications filed.

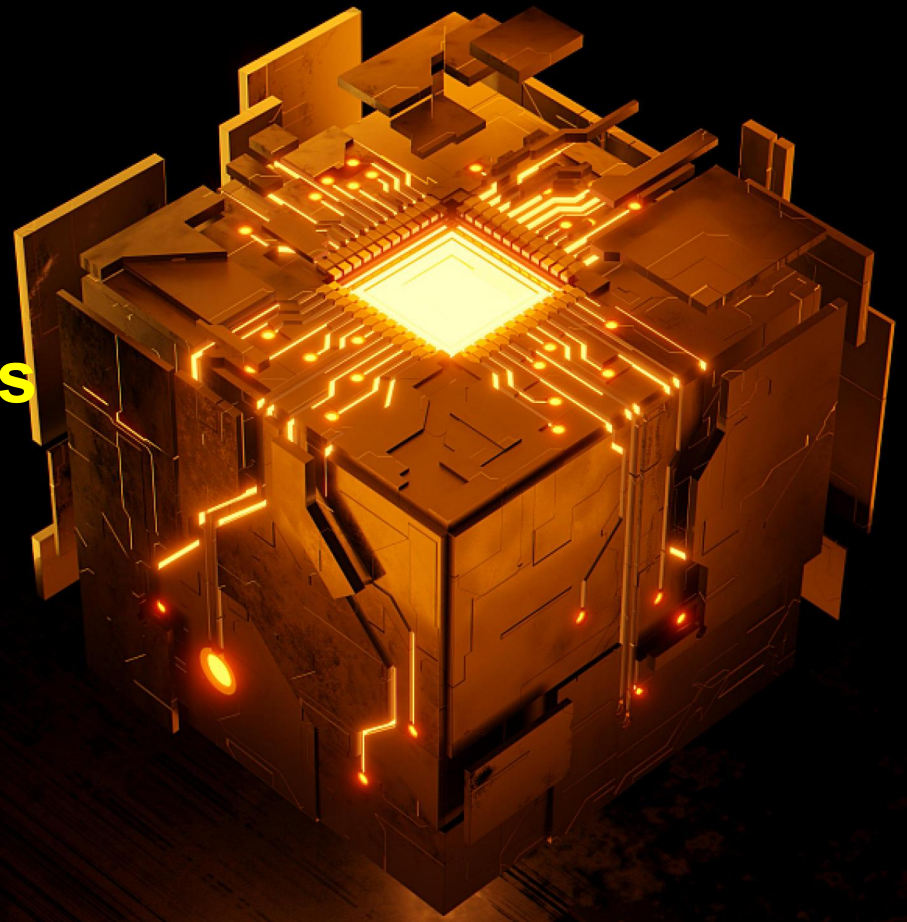
Industry Interaction & International Business

- Cross-Domain Integration in Chemicals & Materials
- Rational Combination of Equipment & Process
- Mutual Promotion of Theory & Practice
- Leveraging University Technical Resources
- Market-Oriented Vision of Leading Enterprises
- The Bridge Between Basic Research & Industrialization

✓ **First overseas order secured in 2025.**
✓ **Actively expanding in USA, South Korea, UK, Germany, France.**

Newmat

Empowering Material Breakthroughs
— with Advanced Powder Solutions



THE END

Thanks