PharmaBlock

PharmaBlock Sciences (Nanjing), Inc.

Chemistry & Engineering Technologies

For Safer, Greener & More Efficient Process Development & Manufaturing

www.pharmablock.com
product.pharmablock.com

PharmaBlock Sciences (Nanjing), Inc. (SZSE:300725) is a leading provider of innovative chemistry products and services throughout the pharmaceutical R&D process and commercial production.

Its core businesses include: a rationally designed building blocks collection, supplying from discovery, to development and commercial; building blocks driven libraries for drug discovery; development and manufacturing of RSMs, intermediates, APIs and drug products for drug development and commercial.

PharmaBlock has invested in a number of innovative technologies to enable greener, safer, and more efficient process for manufacturing. We have a dedicated chemistry and engineering technology team working closely with experts in process development and manufacturing to implement optimal process solutions from pilot to commercial scale.

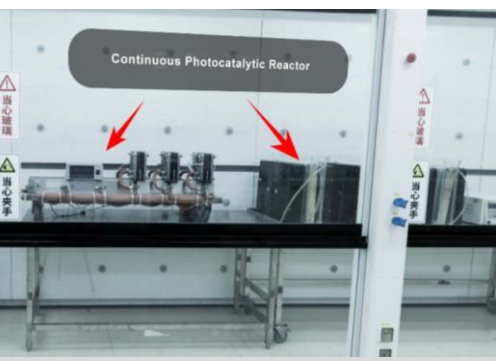
In this booklet, we will demonstrate our capabilities in the chemistry and engineering technologies development and application.

Key Technologies

- Flow chemistry
- Micropacked bed technology
- Catalysis
- Solid state chemistry
- Crystallization
- Engineering technologies

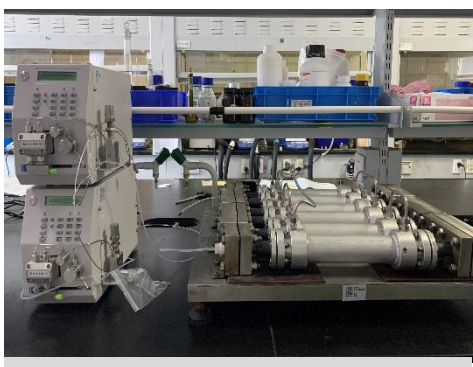
Flow Chemistry

- PharmaBlock has successfully applied flow chemistry into multiple reaction types, including but not limited:
  - ✓ Cryogenic reaction
  - ✓ Diazo chemistry
  - ✓ High temperature and/or high pressure reaction
  - ✓ High energy chemical reaction
  - ✓ Reaction involving pungent and stinky intermediate, SM, product
  - ✓ Reaction involving toxic reagent or product
  - ✓ Oxidation
  - ✓ Nitration
  - ✓ Bromination
  - ✓ Fluorination
  - ✓ Electrolysis
- In-house engineering team that can design and assemble flow reactors of high flexibility.
- Equipped with self-assembled flow reactors with different volumes ranging from 1 mL to 10 L that are fabricated from different materials (PFA, SiC, SS316 etc.)
- Applied both in lab and manufacturing scale for different projects.



Continuous Photocatalytic Reactor


Dynamic Tubular Reactor


Silicon Carbide Tubular Reactor

Micropacked Bed Technology

- Application in multiple reaction types:
  - ✓ Benzyl deprotection
  - ✓ Nitro reduction
  - ✓ Olefin reduction
  - ✓ Reductive amination
  - ✓ Selective pyridine reduction
  - ✓ Selective dehalogenation
- Capabilities to develop and produce different catalysts (eg. Pd(I/II)), Pt, Ru etc.) to provide a better solution to extent catalyst life cycle and reduce cost.
- Capacity: Self-designed and assembled manufacturing-scale equipment which has the capacity of delivering hundred metric ton output annually
- Equipped with DCS (distributed control system) to achieve automatic detection & control of the entire device

Catalysis

Heterogeneous Catalysis

On top of our constantly growing in-house catalyst inventory, we continue to research, design, develop, and manufacture the following catalysts to support our projects.

- Bead supported catalysts and cartridge catalysts used in flow process;
- Powder supported catalysts used in batch process;
- Customized and specialized catalysts;
- Catalyst screening

Biocatalysis

- Enzyme screening and route design;
- Chemo-enzymatic process development and manufacturing;
- Enzyme immobilization;

Solid State Chemistry

- Single crystal culture and structure analysis
- Polymorph/salt/cocrystal screening and research
- Amorphous/co-amorphous screening and research
- Solid-state chemistry characterization
- Solubility and dissolution performance study
- Stability and hygroscopicity study
- Compatibility study
- IND/NDA filing and patent services

Crystallization

- Development of various types of crystallization processes.
- Solving problems of solvent residues, crystal control, purity, and yield.
- PAT technology development.
- Filtration, drying, particle size control, etc.
- Process development of milling, spray drying, granulation, etc.
- Fractionation process of high salt wastewater.
- Process scale-up strategies study.
- Crystallization equipment design and commissioning services.
- Molecular simulation & AI assisted polymorph prediction.

Engineering Technologies

- Selection, design and processing of various scale equipment.
- Equipment matching, engineering services for various types of reaction.
- Micropacked Bed and flow equipment design and processing.
- Innovative continuous processes development and equipment design.
- Development of continuous separation processes, integration of equipment design.
- Equipment Hazop analysis.
- On-site commissioning support.
- Workshops and factory establishment support.
- Dynochem, CFD process simulations.