

PharmaBlock Sciences

Making Waves in the Pharma Industry with Green Chemistry



Jing Li, Ph.D.,
SVP of Process Chemistry, PharmaBlock Group,
and President of PharmaBlock USA

PharmaBlock Sciences is at the vanguard of implementing green chemistry processes, which has emerged as a crucial movement in the pharma industry's ongoing commitment to promote sustainability, environmental responsibility, and public health. Embracing green chemistry practices, it reduces waste, improves

efficiency, and enhances safety, which translates to improved bottom line and better business outcomes.

With innovation at the heart of its ethos, PharmaBlock's mission is to deliver exceptional value to the pharmaceutical industry through two critical dimensions—the breadth and diversity of its offerings in

drug discovery, as well as the speed and sustainability it brings to drug development and commercialization.

Initially established itself as a building block company, PharmaBlock provides an extensive library of over 200,000 structurally diverse and synthetically challenging molecules, offering exceptional opportunities for medicinal chemists to drive innovation. Many of these molecules are not readily accessible as commodity chemicals, making them highly valuable for groundbreaking research. With more drug candidates containing these molecules moving into the development stage, there is a huge demand for a sustainable supply of these molecules on a large scale. The demand and vision for green chemistry inspired numerous innovations and advanced technologies, which enabled the cost-effective manufacturing of building blocks and downstream drug substances. PharmaBlock has now developed itself into a fully integrated CRDMO company, offering a comprehensive range of services, from drug R&D to commercial production. It collaborates with the top pharma and biotech firms worldwide and ensures it has access to the latest advances in sustainability.

“Our unwavering focus on innovation and sustainability has earned us recognition from the American Chemical Society Green Chemistry Institute, which awarded us the CMO Excellence Award for Green Chemistry this year,” says Jing Li, Ph.D., SVP of Process Chemistry, PharmaBlock Group, and President of PharmaBlock USA. “The journey to sustainability is a never-ending pursuit of excellence. We are

committed to this mission and motivated by knowing every small step on this journey has an impact on a greater purpose.”

The firm leverages three business units to help pharmaceutical companies, from drug discovery and development to commercialization. While the Building Block and Research BU serves the discovery phase, the CDMO BU focuses on development and commercialization. Its Technology Innovation Center (TIC) is dedicated to developing cutting-edge technologies that promote sustainability and tackle chemistry challenges at any drug discovery and development stage.

In the drug discovery space, PharmaBlock is known for its novel, diverse, and high-quality building blocks, which inspire drug designs. Combining its vast building block library with drug screening technologies, like FBDD, DEL, and AI, it develops high-efficient solutions for hit generation and hit-to-lead optimization.

For the drug development and commercialization stage, PharmaBlock has developed as a go-to partner with comprehensive CMC capabilities. Furthermore, the company has developed many innovative technologies, particularly in continuous flow technology and biocatalysis areas. In the last five years, PharmaBlock has completed over 1500 projects by implementing flow technology or biocatalysis in chemical synthesis, resulting in enhanced safety, reduced costs, and minimized waste streams.

For more flexible solutions with flow technology, PharmaBlock has designed and developed multiple continuous flow equipment to fit different chemistry reactions. PharmaBlock also excels in creating sophisticated systems capable of multi-stage continuous flow manufacturing, which leads to the CMO excellence award recognition from ACS. Here are some applications routinely operated at PharmaBlock.

Photo reaction is traditionally considered hard to scale up. With the photo flow reactors designed by PharmaBlock, which can reach up to 100 kg per day output, process chemists now have the freedom to apply this type of green reaction in active pharmaceutical ingredients (API) synthesis.

PharmaBlock’s expertise also extends into the field of hydrogenation, where it employs a continuous flow process using micro-packed bed reactors. While micro-packed bed reactors are typically used at a lab scale in the industry, PharmaBlock has taken a step further by designing and assembling manufacturing-scale equipment capable of achieving yearly outputs of hundreds of metric tons. In one instance, PharmaBlock applied this technology to resolve a particularly challenging hydrogenation problem, originally low yield and impurities difficult to remove downstream. Using the micro-packed technology, PharmaBlock achieved 80 percent cost savings, better quality, and over 6 months of timesaving in manufacturing in metric tons scale. PharmaBlock helped its

client to move the drug to market in just two and a half years, an accelerated timeline that would not be possible without this micro-packed technology.

Another remarkable application of flow technology is eliminating the traditional batch process for nitration, which is present in about one-third of pharmaceutical production. By improving thermal control, enhancing safety measures, and reducing waste, PharmaBlock has successfully transformed this corrosive process into a more efficient and eco-friendlier alternative.



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Biocatalysis, a both green and sustainable technology, has also been widely applied in PharmaBlock. By screening commercial enzymes and engineered new enzymes, PharmaBlock unlocks synthetic routes to complex chiral molecules with unparalleled selectivity and efficiency. Further exploiting the opportunities, several strategies and technologies have been developed and applied, such as the use of immobilized biocatalysts to enhance their stability and recyclability and combining immobilized biocatalysts with flow technology to achieve a more sustainable manufacturing process. The increasing mastery of biotechnology allows PharmaBlock to develop enzymes and green processes that can synthesize a widening selection of desirable bulk chemicals at commercially viable productivities.

PharmaBlock is currently focusing on improving its supply chain resilience and widening its global footprint to deliver drug discovery and CMC solutions to international customers. As part of its growth strategy, it is rapidly expanding in the U.S., with the establishment of a state-of-the-art Processed R&D Center including GMP API production capability in West Chester, PA, while expanding and upgrading its production facilities with more sustainable technologies in China. 

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