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MiniPharm: Miniaturized Continuous End-to-End Manufacturing of Solid Pharmaceuticals

A continuous, modular, and scalable manufacturing platform uses microfluidic and 3D printing technologies for robust, controllable, and anti-fouling production of solid active pharmaceutical ingredients.

Current development and manufacturing processes of solid active pharmaceutical ingredients (APIs) are inconsistent, inefficient, inflexible, and contribute to the high cost of drug products incurred by patients. Existing API production technologies are based on batch configurations and are not integrated, have a large footprint, and lack real-time process monitoring and control. These issues, among many others, lead to variable product quality, high labor costs, and suboptimal use of raw materials and inventories.

Researchers at Purdue University have developed a technology that is a continuous end-to-end pharmaceutical manufacturing platform (MiniPharm) using microfluidic and 3D printing and milling technologies for the robust and continuous manufacture of solid API. Using previously inaccessible flow chemistries, the MiniPharm is highly reproducible and controllable. The MiniPharm consists of a network of reconfigurable pharmaceutical unit operations with a specially sculpted microchamber. Each unit is designed to be a module that can be flexibly switched in and out depending on real-time medical demand. Hence, the MiniPharm can be easily reconfigured and adapted to the specific requirement of each API production. These units are exceptionally scalable, requiring the addition of other modules in parallel to increase throughput. The modules also provide flexibility and agility for real-time product releases to overcome manufacturing challenges such as drug surplus and shortage. The MiniPharm is equipped with innovative anti-fouling control to address the interruption of operations due to fouling to which current pharmaceutical manufacturing processes are prone.

Advantages:

-API consistency

-Scalability

Technology ID

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Category

Biotechnology & Life Sciences/Bioprocessing & Biomanufacturing

Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation

Pharmaceuticals/Pharmaceutical Manufacturing & Methods

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View online

-Flexibility

-Portability

-Anti-fouling control

Potential Applications:

-Pharmaceutical industry

-Drug manufacturers

TRL: 4

Intellectual Property:

Provisional-Patent, 2016-05-02, United States | PCT-Patent, 2017-04-24, WO | NATL-Patent, 2018-10-16, United States | Trademark, N/A, United States

Keywords: MiniPharm, continuous pharmaceutical manufacturing, solid API production, microfluidic, 3D printing, pharmaceutical unit operations, anti-fouling control, continuous end-to-end platform, reconfigurable, flow chemistries