

# ***Innovative technologies for the intensified and tightly controlled production of API***

Thanks to the uniqueness of Secoya's technologies, the efficiency of API production is largely improved, yielding products with augmented performance.

## **Applicable to :**

- Intensified chemical processes
- Crystallization
- Pervaporation

## **Secoya's solutions :**

- Laboratory and industrial equipment
- Services for process development

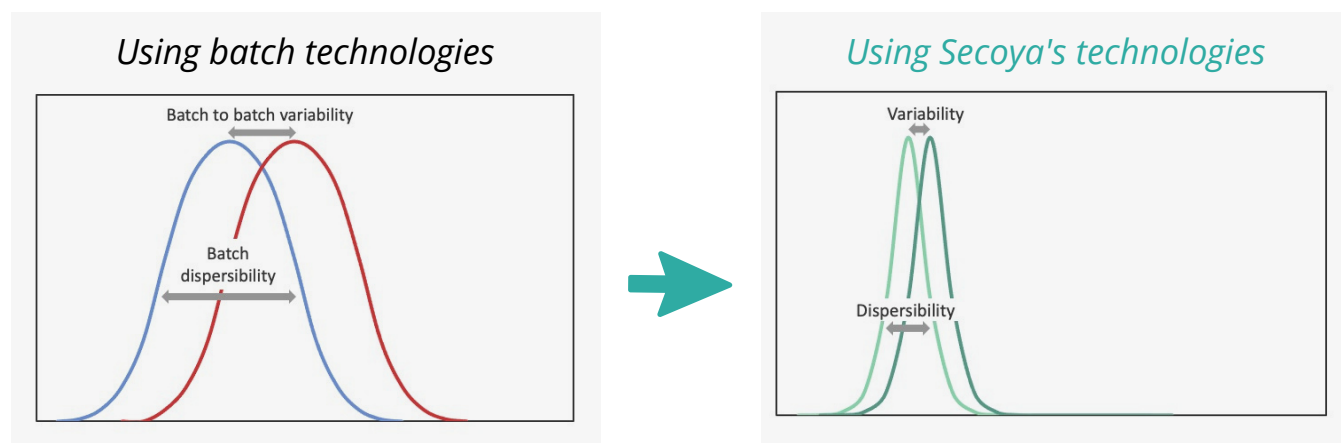




## Unique approach of Secoya

Secoya adapts the scale of industrial process equipment down to the ideal size in order to obtain an optimal control. Typically, Secoya's technologies are based on the use of capillaries whose diameter are in the range of mm or even  $\mu\text{m}$  range. Under these conditions, process parameters are precisely controlled. This results in a product exhibiting a *strongly reduced polydispersity as well as batch-to-batch variability*. Furthermore, such conditions enable performance of processes that are not feasible in conventional batch reactors.

These technologies are inherently compatible with continuous manufacturing.



## Crystallization

### A one-step crystallization process

Through the use of specifically designed reactors, Secoya is able to master supersaturation conditions and to control the nucleation process.

By precisely selecting parameters, nucleation rate can be adjusted to obtain the desired final crystal size, from 1 up to 400  $\mu\text{m}$  in a single crystallization step. Target morphism is easily achieved, as well as a narrow crystal size distribution.

As no physical micronisation is required, low crystal size powder exhibits an excellent flowability and thus excellent powder handling capacities.

The technology has been successfully tested on different molecules.



*The Secoya's crystallization unit*

A pilot unit with a size of 1.5  $\text{m}^3$  is available for testing. It is designed to deliver about 10-15 T/y. It can be used for different crystallization method: cooling, anti-solvent and co-flow



## Pervaporation

### A selective fluid separation technology

Pervaporation is a liquid/liquid separation process through a selective and dense membrane. By creating a vacuum or introducing a flow of purge gas on one side of a dense membrane, volatile compounds in a liquid present on the other side will selectively diffuse through the membrane.



*The Secoya's module for the development lab*

In addition to its high energetic efficiency, pervaporation is not subjected to azeotropic limitations.

The Secoya pervaporation technology is an attractive solution for various applications.

#### Some examples are

- Liquid/Liquid separation in presence of temperature sensitive (bio-) products, extraction of a component such as alcohol or water
- For chemical & bio-process: continuous removal of volatile compounds during fermentation, reaction, or to the feeding of reactants through the membrane.
- Gas perfusion for bioreaction

## Intensified chemical process

### High efficiency and quality by design

For intensified chemical process, Secoya acts as a service provider, developing new processes based on flow chemistry and its unique approach.

Secoya has a robust expertise in the field and has developed a holistic methodology enabling the fast and efficient development of new processes. These can integrate other Secoya's technologies.

#### Case study

Simplification of a process by reducing the number of reaction steps from 3 to 2, while multiplying the productivity by 3000 and increasing the yield from 85 to 95%.

#### Holistic methodology

- Synthesis optimisation
- Reaction and process modelling
- Reactor selection and sizing
- Online monitoring selection and implementation
- Control strategy design

*For any request  
about our equipment and services,  
please contact  
Secoya Technologies*

[www.secoya-tech.com](http://www.secoya-tech.com)

For the crystallization:  
[bart.rimez@secoya-tech.com](mailto:bart.rimez@secoya-tech.com)



For the pervaporation & intensified process:  
[jean.septavaux@secoya-tech.com](mailto:jean.septavaux@secoya-tech.com)



4 Fond des Més  
1348 Louvain-la-Neuve  
Belgium

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