A Technology Opportunity of the University of Liège

Continuous-flow process for a valuable transformation of Glycerol

Glycerol is a by-product of the bio-diesel industry. Presently, about 2/3 of the glycerol production comes from the bio-diesel production where 1 ton of glycerol is produced for 10 tons of biodiesel. Glycerol production is expected to rise in the following years due to the introduction of the E.U. directive 2009/28/EC which requires that, by 2020, a minimum of 10 % of the transport fuel of the E.U countries comes from renewable sources such as biofuels. An overproduction of glycerol is thus expected leading to undoubtedly a pressure on the market prices.

University of Liège has developed a new technology based on continuous-flow process that aims at transforming glycerol in more valuable chemicals.

Description

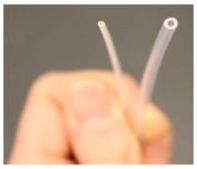
The technology relates to a new scalable, efficient and intensified **continuous-flow process in micro/mesofluidic reactors for the chemical transformation of glycerol into allylic compounds such as allyl alcohol**. The invention provides a safer and cost effective solution by enabling much shorter reaction times (1-6 min) and a higher selectivity than existing batch procedures.

Microfluidic reactors

Channel Ø: 100 µm
V_{int}: 100s µL

-Explore and develop chemistry
-Optimize reaction (R&D)

Mesofluidic reactors



Channel Ø: 800-1000 µm
V_{int}: up to 10+mL

- Pilot and production
- Up to 3500 t/y production

Advantages

- Added-value for your glycerol by-product
- Overcomes the shortcomings of the batch processes :
  - better mixing and heat transfer
  - better control over the reaction conditions
  - improved yield production
  - product with a constant quality and purity profile
  - cleaner process (minimal footprint)
  - safer process

- Suitable for small modular production plants:
  - Space saving
  - High flexibility with short lead time
  - Fast scaling up (shorter time-to-market)
  - Production reactor up to 3500 t/y

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Potential Applications

The patented technology consists in an effective way to transform glycerol in more valuable allylic compounds such allyl esters of allyl alcohol, a precursor to many specialized compounds.

Scientific literature

N. N. Tshibalonza, J.-C. M. Monbaliu, *Green Chem.*, **2017**, *19*, 3006-3013

Patent Status

Patent application pending.

Research Team

This technology has been developed by Jean-Christophe Monbaliu's team, from the Center for Integrated Technology and Organic Synthesis (CiTOS) at the University of Liège (ULiège).

The Center for Integrated Technology and Organic Synthesis is a multidisciplinary team with research interests around synthetic organic chemistry, with a particular focus on continuous flow processes for the preparation of high value-added chemicals.

Jean-Christophe Monbaliu completed his PhD thesis at UCL (Belgium). After a first Postdoctoral position at the University of Ghent in Belgium (2008-2010), he joined the Center for Heterocyclic Compounds at the University of Florida in Gainesville (USA). In 2012, he was appointed at the Massachusetts Institute of Technology (MIT) in Cambridge, MA. During his postdoctoral experiences, he studied chemical engineering and became a specialist in the application of microfluidics to organic chemistry. In 2013, he came back to Belgium, and settled at ULiège where he created the Center for Integrated Technology and Organic Synthesis (www.citos.ulg.ac.be). He has published several papers related to the continuous manufacturing of active pharmaceuticals, among which a seminal work was recently published in Science.

Opportunities

Research collaboration and/or license agreement

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- ❑ I am interested in learning more about the general aspects of this technology. Please contact me.

The best time to reach me is: _____

- ❑ I would like an electronic version of this technology.
- ❑ I would like to learn more about the specifics of this technology and would be wiling to complete a Confidential Disclosure Form in order to discuss it further.
- ❑ I am not interested in this technology because: _____

_____

_____

- ❑ I am not interested in this technology but would be interested in learning more about (please specify): _____

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Name: _____

Title: _____

Company: _____

Address: _____

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