ISGC 2022

N°764 / OC
TOPIC(s) : Alternative technologies / Chemical engineering

Continuous flow beads mechanochemistry for organic synthesis in glycerol valorization

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PURPOSE OF THE ABSTRACT

The drastic explosion of biomass industries of last decades generates many bio-sourced products and by-products that have to be valorized. Glycerol is one major co-product generated by biomass industries. It comes essentially from oleochemical industry by transesterification, hydrolysis, saponification of triglycerides from natural oils and fats. It appears as a fatal molecule from these oleochemical and biodiesel industries. Glycerol is valorized in term of conversion to many valuable products for solvents, additives, biofuel, cosmetic or agro- and food industry. It also becomes a crucial starting point for fine chemistry, particularly the polymer and C3 based chemistry.

Latest works involved the development of continuous flow processes [1]. In the context of the development of new alternative technologies for green and sustainable chemistry, a new concept combining continuous flow and beads mechanochemistry permitting to perform a chemical reaction that is induced by the direct absorption of mechanical energy has been studied and new continuous flow process has been developed by Deasyl. To combine continuous flow with mechanochemistry, new technologies and processes were developed, using different continuous flow cylinder beads reactors with axial accelerator, such as Dyno-mill Multilab, Research Lab, and IMPACT reactors.

The concept was validated with many organic reactions for glycerol valorization. Among others some examples are presented such as semi-continuous biodiesel production catalyzed by calcium diglyceroxyde [2,3], continuous synthesis of solketal [4], O-alkylation of glycerol with dimethyl sulfate for alkyl glyceryl ethers synthesis, or triacetin synthesis through acetic anhydride continuous acetalization.

FIGURES

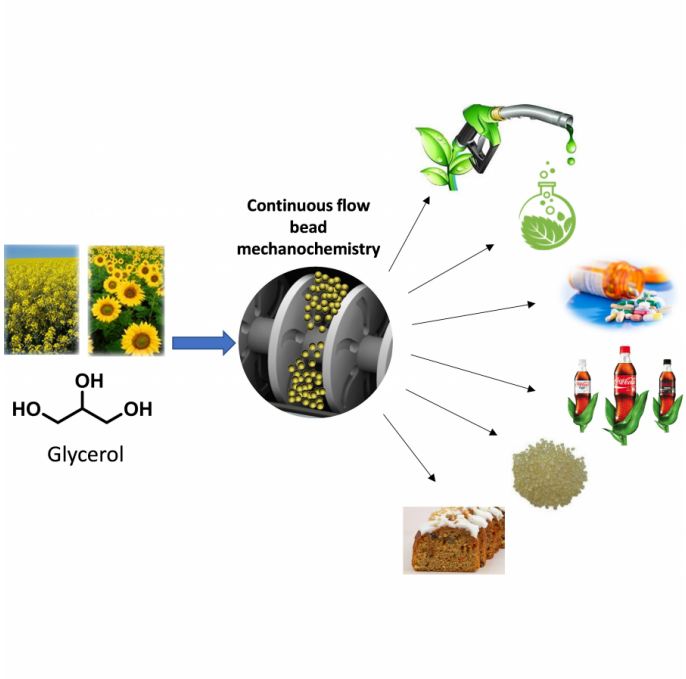

FIGURE 1

Continuous flow beads mechanochemistry for organic synthesis in glycerol valorization

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FIGURE 2

KEYWORDS

Green chemistry | mechanochemistry | organic synthesis | glycerol

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