DOI 10.1515/gps-2012-0069 — Green Process Synth 2012; 1: 533–534

Company profile

Kevin Huvaere*

EcoSynth sheds light on chemistry

***Corresponding author: Kevin Huvaere,** EcoSynth, Plassendale Chemistry Site, Stationsstraat 123, B-8400 Ostend, Belgium, e-mail: khuvaere@ecosynth.be

EcoSynth is a young, dynamic, and autonomous chemical company that is built around a group of experienced scientists with a strong background in various fields of chemistry. The team offers a series of consultancy, custom synthesis, and service activities for chemical, pharmaceutical, and life science industries, with a strong focus on fast, flexible and value-added solutions for all of its customers. Besides contract research, the company is steadily evolving towards proper research and development activities in the field of sustainable chemical processes. Its main aspirations in this field include utilization of biomass as a renewable feedstock, use of continuous flow chemistry as a highly controllable process technology, and implementation of advanced catalysis for the purpose of selectivity and reduction of energy use. In this respect, it is important to note that light is also fit for catalyzing chemical reactions, a century-old technique that is currently being revived by virtue of the developments in flow chemistry. The usefulness of such an approach is elaborated in following report, which describes the hatch of a magic match between flow processing, photochemistry, and innovative thinking.

Photo+flow: why old wine in new bottles tastes better

Background

A continuously changing world confronts our society with a series of major challenges, the tendency of which generally involves securing prosperity by improving sustainability. The chemical industry, as one of the pillars of today's economy, is likely affected and is forced to reconsider its current business models. Focal points are described in *The Principles of Green Chemistry*, which are generalized by the keywords biomass, waste reduction, and environmentally friendly. Substituting light-induced for thermally driven processes is a promising path, which has the potential to meet with these perspectives, as the approach fully complies with the abovementioned principles without sacrificing the performance. Moreover, using new, efficient, light technology, in combination with state-of-the-art flow technology, photochemistry, may even present significant advantages to thermal chemistry. Next to favorable atom economy, high selectivity, and access to deep-seated reactions, the use of cheap catalysts and non-activated starting materials may cut expenses. As such, there is little doubt that keen optimization of this methodology might well favor the reduction of both the ecological and economical footprints of relevant chemical processes.

Challenges

"Too difficult to transfer to production scale" has become the self-fulfilling prophecy that possibly explains the reluctance of industry to engage in photochemistry. Indeed, poor light penetration, inhomogeneous irradiation, and secondary product formation, all of which are issues associated with batch photoreactions, have definitely hampered the embracing of photochemistry as a viable alternative to thermal activation. Recent developments in flow technology, however, have solved many of these shortcomings and the concept as such seems to work in perfect harmony with photochemistry. Reactions in small reactor tubes now guarantee homogeneous irradiation conditions, with superior control of both temperature and exposure time. Still other breakthroughs in LED design support narrow-band excitations, with selective aiming at target sites. The resulting minimal secondary product formation, in combination with low energy consumption of the light source, effectively reduces the process cost with respect to traditional batch irradiations. As for scale-up, size no longer matters, as multiplication of numbers is the new mantra.

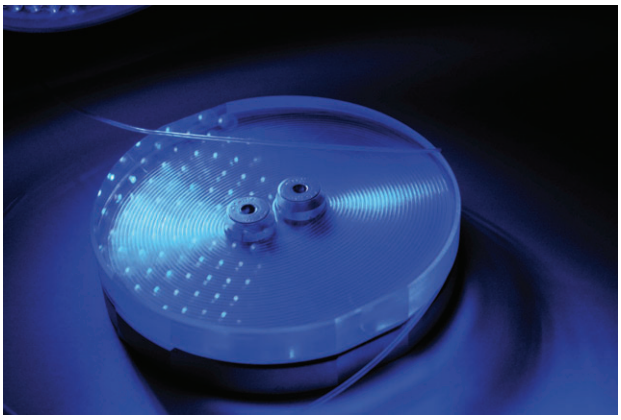

Figure 1 Modular photo+flow system designed by EcoSynth.

Figure 2 EcoSynth, the piece that completes your research puzzle.

Strategy

EcoSynth has developed a series of smaller sized, modular reactor systems that are ideally suited for rapid screening of photochemical conversions. Currently, using these devices for proprietary research purposes (in the advent of future commercialization), EcoSynth successfully developed a series of continuous flow photochemical conversions. Light-induced syntheses, with staggering reactor residence times of only 15 s were measured for selective reactions, with >99% conversion and >95% yield of the desired product. Moreover, a particularly interesting applicability of photochemical methodology was developed for the treatment of biomass. By carefully selecting appropriate feedstock, EcoSynth managed to upgrade a low-valued waste stream into relevant oleochemicals. Traditional processes for such conversions are typically energy-consuming, using high temperatures and possibly elevated pressure for successful conversion. Due to the low temperature at which the photochemical reaction occurs, in combination with energy-saving LED irradiation and the lack of additional reagents, the process is considered to be highly sustainable.

Future

The fruitful outcome of EcoSynth's efforts to apply photochemical technology as a clean and effective route to upgrade low-value waste streams to useful oleochemicals, opens new avenues to optimize biomass utilization and to reduce waste fractions. To fuel the ambitions in developing new, clean and sustainable innovation, including further development of light chemistry and market introduction of complementary technologies, EcoSynth is continuously looking for partnerships with interested companies.

Please find out more about EcoSynth through the following channels:

Phone: +32 59 55 02 35
E-mail: info@ecosynth.be
web: www.ecosynth.be