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Company profile

Uniqsis – accessible flow chemistry

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Systemic solutions to the needs of flow chemistry

Flow chemistry is a rapidly emerging technology that has recently gained a place alongside conventional batch and microwave-assisted organic synthesis (MAOS) as a complementary technique for molecule makers.

Uniqsis is a young and dynamic high-technology business specialising in the design and manufacture of high-quality, innovative meso-scale continuous flow reactors known as FlowSyn™ systems. Based near Cambridge, England and part of the thriving and internationally renowned hi-tech and biotech industries centred in the Cambridge area, Uniqsis was founded in 2007 as an alliance between Asynt, a specialist supplier of organic synthesis apparatus, and Grant Instruments Ltd, a long-established manufacturer of temperature control and data acquisition equipment.

In laboratory flow chemistry, high pressure pumps continuously feed reagent streams into a mixer that allows diffusion across a short distance and promotes rapid and controlled mixing. The reactions take place in a narrow channel, which promotes excellent heat and mass transfer. The short processing times and high reproducibility of results allow rapid exploration of a range of reaction conditions, which makes flow chemistry an ideal research tool, particularly for the pharmaceutical industry.

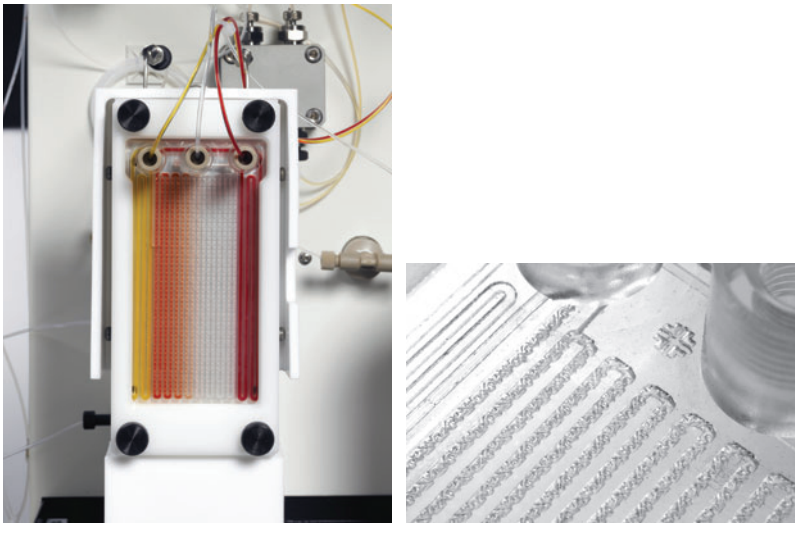
A chemist can change the temperature, reactor residence time and stoichiometric ratio defined by the concentration of the reagents, volume of the reactor and flow rates. These small, contained reactors (270 microlitres to 60 millilitres) reduce risk compared to batch reactors.

The key product range developed and marketed by Uniqsis is the FlowSyn™, a compact and fully integrated continuous flow reactor system capable of handling an extensive range of flow chemistry experiments – from the simple to the highly sophisticated. FlowSyn™ can be used for reaction profiling and optimisation, particularly prior to scale up.

In designing the FlowSyn™ system, Uniqsis followed three guiding principles:

- to provide flow chemistry systems that are easily accessible to novices and have the in-built flexibility to cater to their growing and increasingly complex application needs,
- to develop products that deliver supreme performance, durability and safety,
- to provide state-of-the-art solutions to a wide range of applications by working in partnership with other specialist manufacturers renowned for innovation in their particular fields.

For example, Uniqsis collaborates with Cambridge Reactor Design to commercialise low temperature and gas



Static mixer/reactor chip.

addition modules for FlowSyn™ and with the Swedish company WaveCraft to commercialise a microwave generator/applicator for continuous-flow microwave-assisted organic synthesis (CF-MAOS) with FlowSyn. Uniqsis also offers a range of static mixer/reactor chips for mixing and for fast exothermic reactions. These borosilicate glass chips can operate up to 40 bar and at temperatures between -80°C and 150°C.

The FlowSyn™ system

Users can specify flow path materials for optimum chemical compatibility, choosing from all PTFE (polytetrafluoroethylene), stainless steel or Hastelloy® combined with PTFE or PFA (perfluoroalkoxy).

In the standard FlowSyn™ system, two high-pressure pumps (up to 100 bar) deliver reagents, via a mixer, into heated or cooled flow reactors. Back pressure regulators pressurise the system, which allows solvents to be superheated. Reaction outputs can be fractionated or optimised at steady state, after which the system automatically flushes itself and is ready for the next experiment.

The system is easily operated and controlled from the FlowSyn™ user interface, which consists of four simple push-buttons and a large clear screen. It can also be operated via a dedicated PC-based control and data capture program.

The FlowSyn™ range is modular and fully upgradeable. Multiple experiments can be performed with the addition of a fraction collector and library work performed from up to 14 different reagents, as part of the fully automated FlowSyn™-ALF. A built-in column module can be used for catalytic work, immobilised reagents or scavenger resins.

FlowSyn™-ALF.

The Gas Addition Module provides a safe and efficient means of performing gas-liquid reactions under continuous flow-through conditions. Its primary purpose is to provide a solvent feed2stream pre-saturated with gas, but it can also be used as a reactor in its own right by mounting it on the FlowSyn™.

FlowSyn™ Binary Pump Module.

FlowSyn™ Maxi with gas reactor.

The current FlowSyn product range comprises models for single homogeneous and heterogeneous reactions, multiple reactions, automated combinatorial experiments, CF-MAOS, low temperature/multi-zone temperature experiments and higher throughput single reactions.

Typical applications are described in detail in a wide range of application notes (available from the Uniqsis website at www.uniqsis.com) and include hydrogenation, nitration, bromination, metalation, Fischer Indole, Curtius, Suzuki Miyaura, Hantzsch and Newman Kwart chemistries.

The Uniqsis team

The Uniqsis management team combines in-depth scientific knowledge and long-standing experience in flow chemistry with extensive international commercial expertise.

Key members of the team include Chief Scientific Officer Dr. Mark Ladlow, formerly head of the GSK Cambridge Technology Laboratory based within the University of Cambridge. It was there that, in recent years, he collaborated closely with Professor Steven Ley in developing flow chemistry as an emerging new chemistry technology.

Paul Pergande, Group Managing Director, is responsible for all aspects of business development. With a background in chemistry and marketing, Paul has been involved with scientific product development and international marketing for 30 years. He was formerly Sales and Marketing Director and Technologies Director at Grant Instruments, and his team there was responsible for developing the original FlowSyn.

With its ease of use and high levels of performance, versatility and safety, FlowSyn™ has become the research tool of choice for many research chemists within major pharmaceutical companies and academic research laboratories around the world.

Uniqsis is represented internationally by a growing network of fully trained professional distributors who sell and support FlowSyn™ around the globe, including in the UK, France, the Netherlands, USA, Brazil, India, China and Japan.

To find out more about FlowSyn or to discuss your flow chemistry application, call us at +44 (0) 845 864 7747, e-mail us at uinfo@uniqsis.com or visit www.uniqsis.com.