

Micro Reactor Technology: safe, green and sustainable

Introduction

Currently we are dealing with global challenges mainly caused by a growing population and a depletion of our natural resources. The development of new technologies can significantly add to a more sustainable world. One of the most promising novel production technologies is continuous flow production on a micro scale, also known as Micro Reactor Technology (MRT). This technology offers the possibility of cheaper, cleaner and safer production of chemicals and materials.

There are many drivers for industries to switch to continuous flow processes. In 2011, dr. Janet Woodcock (FDA) predicted 'in the next 25 years current manufacturing processes are abandoned in favour of

cleaner, flexible, more efficient continuous manufacturing'. Adoption, however, is still hampered by the fact that it competes with established, and in most cases fully written off, production infrastructure. For adoption and implementation of promising new technologies by SME's, these technologies often need a specific, time consuming and expensive development. Furthermore, the current chemists are trained using the same batch methods as used in the "old alchemy days". For a successful implementation of continuous manufacturing a multi-disciplinary team having knowledge about chemistry, chemical engineering and mechanical engineering is needed. To overcome these hurdles a change is needed in the current initial and life-long learning educational programmes.

Research Centre for Material Sciences

The aim of the Research Centre Material Sciences is to facilitate sustainable innovative research and development in the field of polymeric materials; connecting innovation and learning.

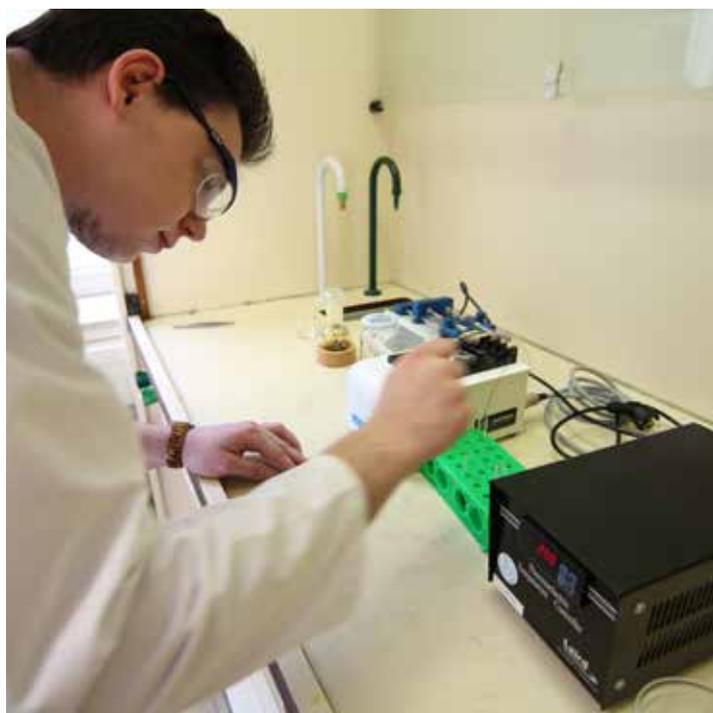
Focus in our research is on three key technologies: MicroReactor Technology, Nano Technology and 3D Printing Materials.

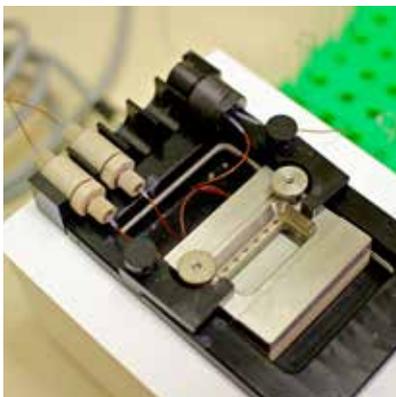
Partner of

Chemelot Innovation and Learning Labs



www.chemelot.nl www.zuyd.nl





Project period

October 1, 2012 - April 1, 2015

Grant

EU-Erasmus-FEXI

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Research partners

- Dublin City University (DCU), Ireland
- Provadis School of International Management & Technology, Frankfurt, Germany
- University of Hull, England
- Open Universiteit, Heerlen, The Netherlands

Websites

www.microreactortechnology.eu
www.zuyd.nl/onderzoek/lectoraten/material-sciences

Contact

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Objectives

The main goal of the project is to tackle the barriers that hamper the adoption of MRT by companies. To this end tools are developed for a Network on Innovation and Learning (NIL) i.e. educational tools (multidisciplinary basic knowledge and skills, time and place independent), applied research (i.e. apply the technology in feasibility studies and with the market) and further (academic) development of the technology.

Project

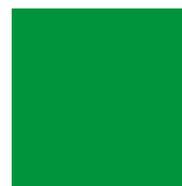
By conducting the research in (international) multidisciplinary research groups consisting of starting professionals (students), an experienced professional and a coach we also educate our students in a real life environment. In this so called Community for Development (CfD), the learning experience of students, professionals and coach is monitored by an assessor. Members of a CfD are not restricted to people from universities (of applied sciences) but can also come from companies thus transferring knowledge from universities to companies and vice versa.

To support the (international) interaction between the researchers involved in a project but also with other interested researchers and lecturers from other knowledge institutes and companies, communications tools are developed.

The final goal of this project is a website which serves as a portal where a NIL consisting of students, lecturers and researchers can exchange information and collaborate or find collaborations in the field of MRT.

In the NIL-MRT project 5 universities from 4 European Countries (The Netherlands, Germany, United Kingdom and Ireland) work together (in collaboration with more than 10 SME's and several other universities) to reach their goals by:

- Development of the Network for Innovation and Learning
- Development and implementation of education material MRT
- Case studies



Results

Development of the Network for Innovation and Learning
Aim of the project is combining information and knowledge exchange with community building learning in CfD's and NIL's (knowledge or expertise networks).

To this end, an innovative web space www.microreactortechnology.eu, is constructed containing:

- **A knowledge base** Here you find e-learning modules of several levels. Via linked keywords it is possible to design your own pathway or find additional information on a topic. Furthermore you will find here descriptions of experiments that can be conducted in lab classes (teaching method), theoretical information and overheads of presentations.
- **Communities** This provides an interactive working space where people can share information, create communities organize training activities, co-create material develop teaching material etc.
- **Case studies** Research to develop lab classes, to investigate the use of MRT for specific chemical processes (with SME's) and to further develop the technology (e.g. by the design, production and application of a microreactor for photochemistry) is presented here.

For clear communication reasons we have decided to base the NIL-MRT website (www.microreactortechnology.eu) mainly on knowledge sharing and education. Research for and with companies will be directed via CHILL (www.chillabs.nl).

Grant

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Research Partners

