

### Module III: Analytics and industrial applications

(September 30 – October 1, 2014)

**Organizer:** O. Trapp, Heidelberg University/D; J. Klein, hte AG, Heidelberg/D; W. Schrof, BASF SE, Ludwigshafen/D

This module focuses on industrial implementation and application of high-throughput technologies in the areas of catalysis and materials development. Guided excursions through the industrial high-throughput laboratories at BASF and hte will be complemented by commercial case studies. Heidelberg University in turn will demonstrate how adaptation of high-throughput methods to analytical methods can be used to gain unprecedented insights into the progress of chemical reactions and on how to control them.



### Module IV: Inorganic functional materials

(September 8 – 9, 2015, Bochum, Germany)

**Organizer:** A. Ludwig, Ruhr-Universität Bochum/D; J. Paul, FLAMAC, Ghent/B

The discovery and optimization of novel functional inorganic materials can be efficiently accomplished using high-throughput thin-film fabrication techniques coupled with high-throughput characterization methods. Combinatorial thin-film libraries can be prepared in different ways, e.g. in form of continuous composition spreads, either by wedge-type multilayer deposition or co-deposition. Additionally, high-throughput technologies have been developed for accelerated synthesis and characterization of functional nanoparticles.

Measurement techniques have been adapted for quick evaluation of material libraries mapping a variety of physical characteristics including optical, electrical and magnetic properties.

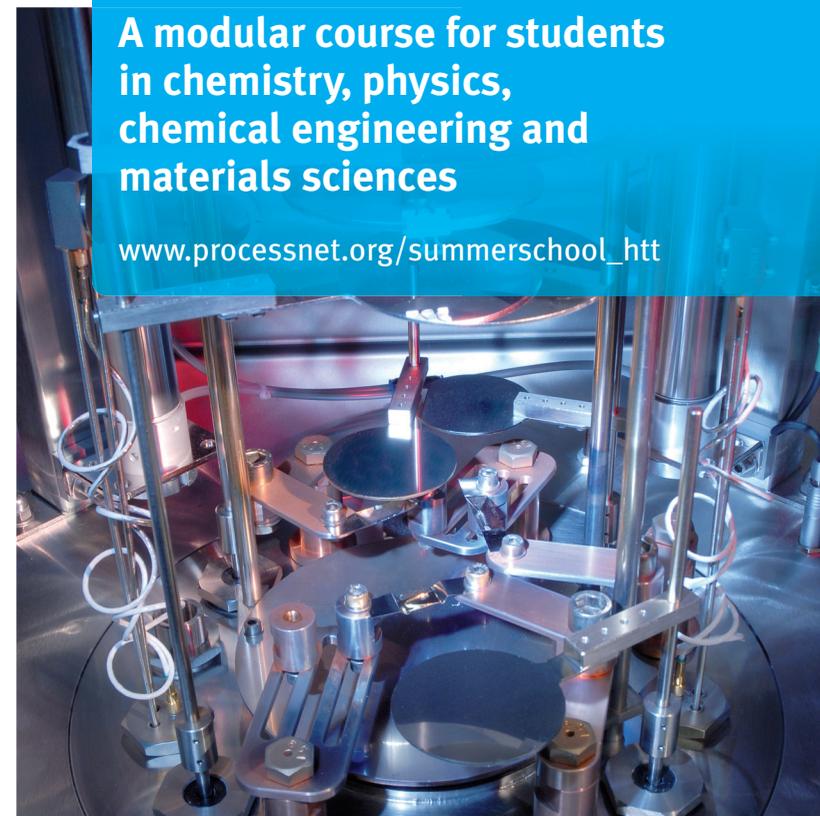
These advanced technologies will be introduced, discussed and visited at Ruhr-Universität Bochum.



## High-throughput Experimentation

A modular course for students  
in chemistry, physics,  
chemical engineering and  
materials sciences

[www.processnet.org/summerschool\\_htt](http://www.processnet.org/summerschool_htt)



All course modules are taught in English and are open to all European students at bachelor, master or doctorate degree level. Modules can be attended independently.

Industrial participants will be admitted at a slightly increased participation fee, if places are available.

ProcessNet is a joint initiative of DECHEMA and VDI-GVC in the area of chemical engineering.

#### CONTACT AND REGISTRATION

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**PROCESSNET**  
EINE INITIATIVE VON DECHEMA UND VDI-GVC

## INVITATION

## HIGH-THROUGHPUT EXPERIMENTATION

Have you ever wished for smart alternatives to slow experimental progress? Did you find yourself getting tired of repeating experiments many times, one after the other to improve your materials? Have you ever thought of bringing conventional experimentation to a new level of success rate and confidence in its results? Have you been unsatisfied with leaving information behind due to time constraints on your projects?

The machinery of research and innovation is going ever faster. Conventional approaches for experimentation quickly reach their limitations if multiple parameter optimizations are concerned, as it is generally the case with real world problems in materials sciences.

There are tools and methods available that can significantly speed-up experimentation, analytics and materials testing when combined with enhanced data evaluation. While these methods are especially in combination extremely powerful, even to apply those separately at well considered points to a scientific problem often results in acceleration and new insights.

ProcessNet and its partners offer a special course consisting of 4 modules:

- » **Organic and polymer-based functional materials**  
(October 15–16, 2013)
- » **Fundamental aspects of combinatorial chemistry**  
(March, 18–20, 2014)
- » **Analytics and industrial applications**  
(September 30–October 1, 2014)
- » **Inorganic functional materials**  
(September 8–9, 2015)

## MODULE I

**Module I:  
Organic and polymer-based functional materials**

(October 15-16, 2013, Jena, Germany)

**Organizer:** U. S. Schubert; Jena Center for Soft Matter (JCSM) – Friedrich Schiller University Jena/D, Dutch Polymer Institute (DPI), Eindhoven/NL

This 2-day module covers combinatorial and high-throughput experimental techniques in organic chemistry and polymer science:

- » Parallel synthesis/polymerization
- » Microwave-assisted reactions
- » High-pressure reactions
- » Combinatorial inkjet printing
- » Combinatorial formulations
- » Characterization
- » Data handling & mining, e-notebooks

Subjects are introduced in lectures and laboratory experiments.

The scientific workshop “**High-throughput experimentation in polymer science**” jointly organized by the Dutch Polymer Institute (DPI) and Jena Center for Soft Matter (JCSM) / Friedrich Schiller University Jena takes place just before the course module on October 14-15, 2013 at the same venue. Participation is free of charge. Registration via [www.combimat.org](http://www.combimat.org)



Friedrich-Schiller-Universität Jena

## MODULE II

**Module II:  
Fundamental aspects of combinatorial chemistry**

(March 18-20, 2014, Saarbrücken, Germany)

**Organizer:** K. Stöwe, Universität des Saarlandes, Saarbrücken/D

Apart from a theoretical part focusing on Design of Experiment (DoE) and the basics of the experimental modules presented in the second, practical part, this module has the objective to introduce a modular course that has been designed to allow an affordable implementation of combinatorial and high-throughput experiments in academic teaching laboratories. Currently, the course consists of five experimental modules. These include a Split & Pool experiment for catalytic screening with mixed metal oxides, a combinatorial synthesis of an azo dye library, an investigation of ternary phase and Kahlweit fish diagrams for micro-emulsions, the DoE and automatization of parallel Sonogashira-Hagihara cross-couplings and a wettability gradient library synthesis of semifluorinated organosilanes.

This module gives a good overview on the basic methodology and introduces its applications.



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