

### Module III: Analytics and industrial applications

(tba)

**Organiser:** 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 adaption 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

(tba)

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

The discovery of novel functional inorganic materials can be efficiently accomplished using high-throughput thin-film fabrication techniques coupled with rapid characterization schemes. Combinatorial thin-film “libraries” can be prepared using discrete, sequentially masked depositions and co-deposited composition spreads. Additionally, high-throughput technologies have been developed for accelerated synthesis and characterization of functional nano-particles.

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 visited at Ruhr-Universität Bochum, RWTH Aachen and FLAMAC.



All course modules are taught in English and are open to all European students at bachelor, master or doctorate degree level. Professionals from industry and academia can participate if places are available at an increased participation fee.

Modules can be attended independently. The number of participants is limited to 30 per course module.

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

#### CONTACT AND REGISTRATION

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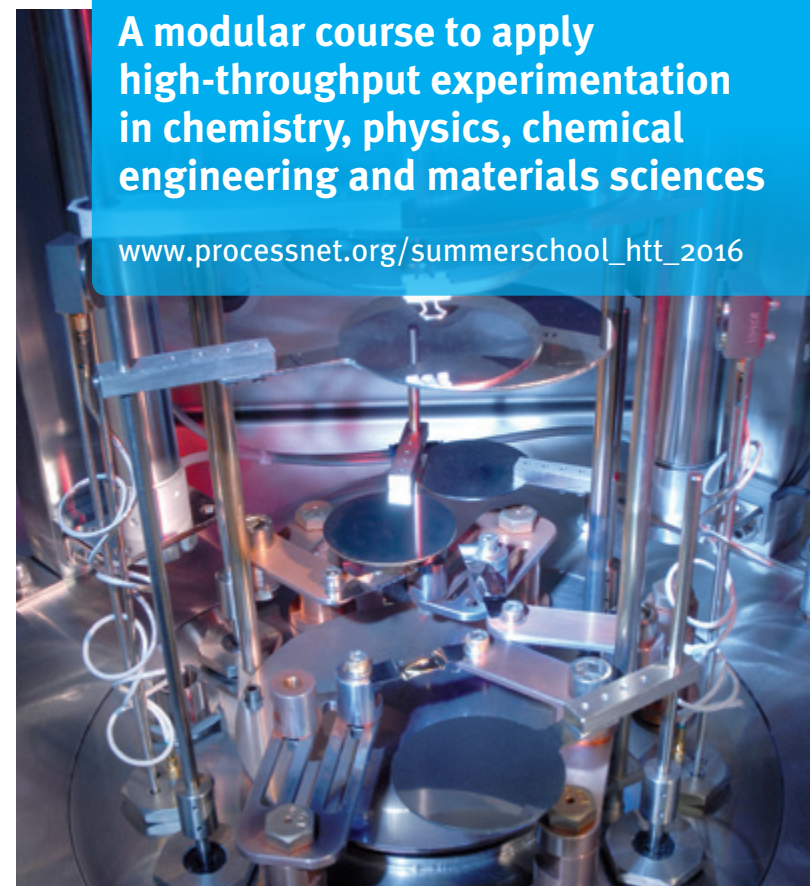
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## INVITATION

# High-throughput Experimentation

A modular course to apply  
high-throughput experimentation  
in chemistry, physics, chemical  
engineering and materials sciences

[www.processnet.org/summerschool\\_htt\\_2016](http://www.processnet.org/summerschool_htt_2016)



## 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 turning 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 if applied in isolation at critical junctions of a scientific problem, often results in significant acceleration and new insights.

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

- » **Fundamental aspects of combinatorial chemistry**  
(28-30 September 2016)
- » **Organic and polymer-based functional materials**  
(28-30 September 2016)
- » **Analytics and industrial applications**  
(tba)
- » **Inorganic functional materials**  
(tba)

The first two modules will be organized as an add-on event to the 9<sup>th</sup> International Conference on Combinatorial and High-Throughput Materials Science, 26-28 September 2016 in Jena, Germany.

## MODULE I

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

(28-30 September 2016, Jena, Germany)

**Organiser:** K. Stöwe, Technical University of Chemnitz/D

Apart from a theoretical part focusing on Design of Experiment (DoE) and HTT methods in catalysis as well as the basics of the experimental modules presented in a 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 microemulsions, the DoE and automatization of parallel Sonogashira-Hagihara cross-couplings and a wettability gradient library synthesis of semifluorinated organosilanes.



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## MODULE II

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

(28-30 September 2016, Jena, Germany)

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

This 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



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