March 11-12, 2025

COMPACT COURSE CIRCULAR CARBON: CHEMICAL RECYCLING AND BIOWASTE UTILIZATION VIA PYROLYSIS AND GASIFCATION

COURSE DESCRIPTION

The compact course “Chemical Recycling and Biowaste Utilization via Pyrolysis & Gasification” will enable participants to obtain an overview of circular carbon technologies for biogenic feedstocks and municipal waste streams, as well as opportunities and challenges for their integration into existing chemical value chains. The course extends over two days, including theoretical and practical elements.

Introduction to Circular Carbon and Chemical Recycling: Participants will be introduced to the fundamentals of thermochemical conversion processes involving pyrolysis and gasification as well as typical key performance indicators used. Different feedstock materials for circular carbon processes and typical methods to characterize their properties will be introduced and explained. An overview of chemical recycling and biowaste utilization will provide participants with an understanding of general chemical recycling / biowaste utilization pathways and associated representative technologies.

Industrial Circular Carbon Technologies & Integration Possibilities: Participants will obtain in-depth insights into different pyrolysis and gasification processes, their industrial deployment as well as integration possibilities into existing chemical production value chains. An impression of the specialized laboratory, bench-scale and pilot-scale facilities for chemical recycling at the Institute of Energy Process Engineering & Chemical Engineering, TU Bergakademie Freiberg and the Fraunhofer Institute IKTS group for Circular Carbon Technologies in Freiberg rounds up the course.

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INSTITUTE OF ENERGY PROCESS ENGINEERING AND CHEMICAL ENGINEERING

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TARGET GROUP

The course targets engineering, technical and management personnel who are interested in obtaining a general overview, first insights and/or to extend their knowledge on chemical recycling technologies involving gasification and pyrolysis, and to understand their strengths and limitations as well as opportunities and challenges associated with their implementation.

TRAINING LOCATION

Institute of Energy Process Engineering and Chemical Engineering

Fuchsmuehlenweg 9 D, Reiche Zeche, 09599 Freiberg

REGISTRATION FEE

3,500.00 € (1) for two-day course.

REGISTRATION

For any questions and registration, please contact Dr. Sindy Bauersfeld
(Email: compact-course@iec.tu-freiberg.de; Telephone: +49 3731 39 4536)

CANCELLATION POLICY

Cancellations have to be sent to the IEC in text format. If you cancel your registration at least 20 days prior to the start date of the event, the full amount will be reimbursed (minus a handling fee of 200 €). After this deadline, no refunds will be given. If needed, the event registration can be changed to a substitute attendee. In this case, no cancellation fees or extra costs will be incurred.

(1) Excluding VAT on catering.

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SCHEDULE

Time and Speaker	Topic
Tuesday, March 11, 2025	
08:30 – 08:45 **Prof. Martin Gräbner**	**Welcome & Introduction** **Expectations of Participants**
08:45 – 10:30 **Prof. Martin Gräbner**	**Fundamentals of Pyrolysis and Gasification** - Terms and definitions of thermochemical conversion - Mechanism and reactions of pyrolysis and gasification - Thermodynamic and kinetic aspects - Conversion criteria and KPIs - Process classification
10:30 – 11:00	**Short Break**
11:00 – 12:30 **Stefan Thiel**	**Fuels for Pyrolysis and Gasification Processes** - Classification and characterization of secondary feedstock - Feedstock sampling, preparation and analysis - Characterization and chemical analyses of solids, liquids and gases from technical plants - Impact of feedstock properties on pyrolysis and gasification processes
12:30 – 13:30	**Lunch Break**
13:30 – 14:30 **Prof. Martin Gräbner**	**Overview of Chemical Recycling Processes** - General pathways of chemical recycling and representative technologies - Feedstock requirements, process complexity, carbon recycling rate, product yield and quality, latest developments and TRL
14:30 – 15:30 **Prof. Martin Gräbner**	**Overview on Biowaste Utilization** - Pathways and principles for biowaste utilization - Feedstock requirements, process complexity and performance, exemplary technologies and latest developments and TRL
15:30 – 16:00	**Short Break**
16:00 – 17:30 **Stefan Thiel, Dr. Jörg Kleeberg**	**Large-Scale Facilities for Chemical Recycling** - FlexiEntrained (GSP gasification process) - Fraunhofer pyrolysis platform (LTC/CTC processes)
19:00 – 21:00	**Networking Dinner**
Wednesday, March 12, 2025	
08:30 – 9:30 **Antonia Helf**	**Industrial Pyrolysis Technologies** - Classification of pyrolysis technologies - Technology introduction (Batch, Rotary Kiln, Auger/Screw, Stirred Tank, Vertical/Shaft)* - Industrial deployment for biomass, plastic and mixed waste pyrolysis
09:30 – 10:00	**Short Break**
10:00 – 12:00 **Prof. Martin Gräbner**	**Industrial Gasification Technologies** - Classification of gasification technologies - Technology introduction (Moving-Bed, Fluidized-Bed, Entrained-Flow)* - Industrial deployment of waste gasification - Key considerations & constraints for gasification of different types of waste
12:00 – 13:00	**Lunch Break**
13:00 – 14:30 **Dr. Florian Keller**	**Pyrolysis and Gasification in Industrial Process Chains** - Pyrolysis products (quality, upgrading and utilization as alternative feedstock for cracker/POx) - Syngas treatment (typical contaminants, gas cleaning, CO shift, acid gas removal) - Syngas utilization (methanol, MtX, Fischer-Tropsch) - Alternative routes for integration in chemical production chain
14:30 – 16:00 **Olaf Schulze, Stefan Thiel, Dr. Marcus Schreiner**	**Laboratory, Bench-Scale & Large-Scale Facilities for Chemical Recycling** - FlexiSlag – fixed-bed slagging pilot gasification plant for multiple solid feedstock - FlexiFluidized – entrained/fluidized bed pilot gasification plant for multiple solid feedstock - FlexiPox – high pressure partial oxidation pilot plant for gaseous and liquid hydrocarbons (e.g. oil residues, pyrolysis oils) - Bench-scale pyrolysis equipment - Specialized laboratory equipment for feedstock characterization & analysis
16:00 – 16:30	**Round Up & Closing**

*Upon request at course registration special technologies can be integrated into the lectures.

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