Technische Universität Berlin

Gas Analysis Workshop Berlin 2014 - Introduction

Dr.-Ing. York Neubauer | Institute of Energy Engineering | Berlin 03.04.2014

EVUR

overview

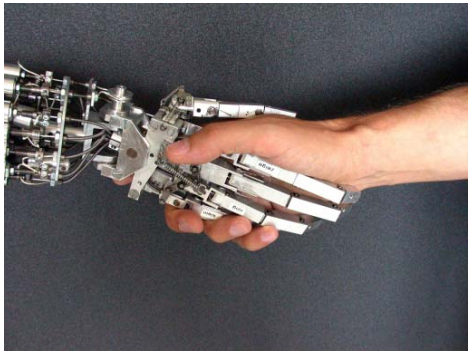
- TU Berlin and Institute of Energy Engineering
- Junior research group –TCKON
- **Scope of the workshop and the webinars**

Main Campus

Profile

Technische Universität Berlin, a university with international reputation in Germany‘s capital and in the heart of Europe

- Third largest University of Technology in Germany
- Research and teaching ranging from engineering and natural sciences to humanities and social sciences
- Intensive cooperation between science and industry
- Joint research projects with numerous non-university research institutes
- Alliance between technology and humanities to meet the challenges of the future



Interdisciplinary research to answer the questions of tomorrow

Challenges to be met

- Climate Change
- Urbanization
- Infrastructure
- Resource Management, intelligent handling of Water, Energy, Food, Health, etc.

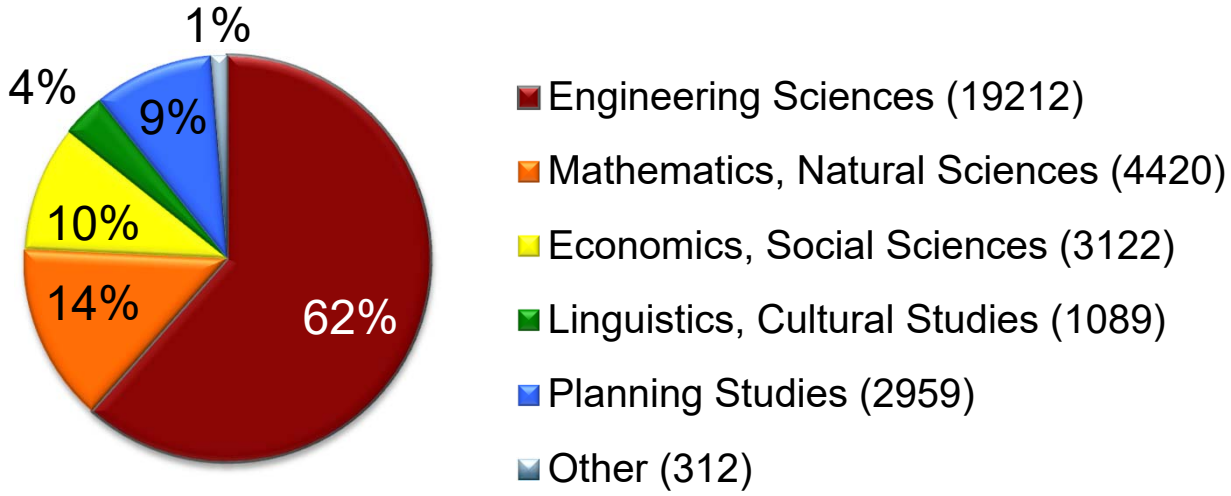
These fields require invention and innovation:

6 Innovation Centers

- IC Energy
- IC Human Centric Communication
- IC Knowledge Research
- IC Technologies for Health and Nutrition
- IC Water in Urban Areas
- IC Habitat Design

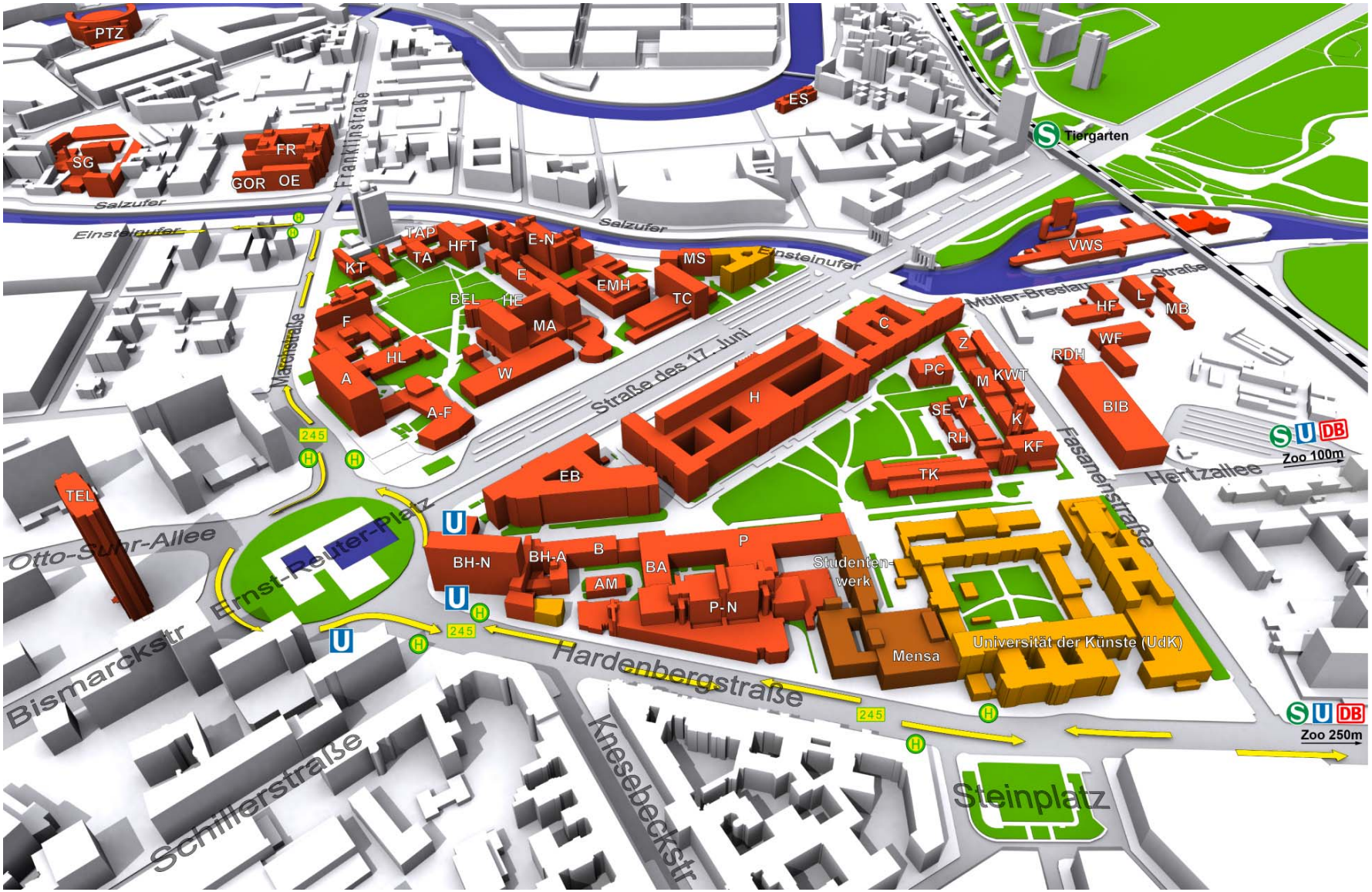
Students by subjects

Breakdown of the 31.204 students according to academic subject groups



Data as of: winter semester 2012/2013

Campus Map


PTZ
SG
FR
GOR
OE
Salzufer
Einsteinufer
Fraunhoferstraße
ES
Tiergarten
TAP
HFT
TA
KT
E-N
E
EMH
MS
TC
BEL
HE
MA
F
HL
A
A-F
W
VWS
Müller-Breslau-Straße
HF
L
MB
WF
RDH
BIB
Z
PC
M
KWT
SE
V
K
RH
KF
TK
C
H
Straße des 17. Juni
Marchstraße
245
EB
TEL
Otto-Suhr-Allee
Ernst-Reuter-Platz
BH-N
BH-A
B
BA
AM
P
P-N
Studenten-werk
Mensa
Universität der Künste (UdK)
Fasanenstraße
Hertzallee
Zoo 100m
Zoo 250m
Bismarckstr
Hardenbergstraße
Schillerstraße
Knesebeckstr
Steinplatz

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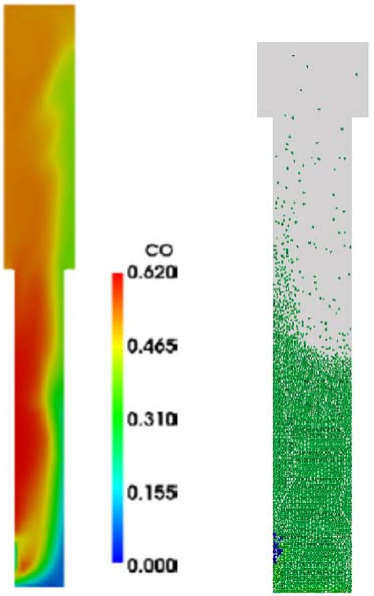

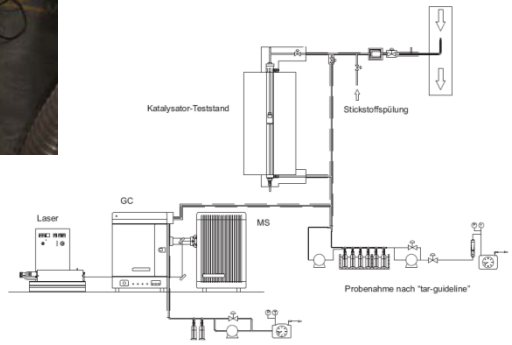

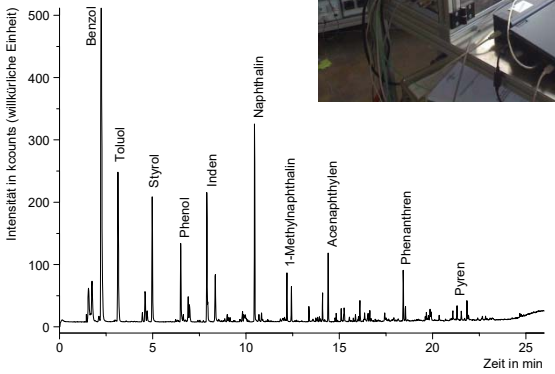

Technische Universität Berlin (Berlin Institute of Technology)
School of Process Sciences
Institute of Energy Engineering
Chair for Energy Process Engineering and Conversion Technologies for Renewable Energies (EVUR)
Head: Prof. Dr. Frank Behrendt
www.evur.tu-berlin.de

Research on reactive flows in and around porous media

- Gasification of Biomass in Fluidized Bed
- Heat transfer, pyrolysis and gasification in fixed bed
- Online tar-Analysis
- *Hydrothermal carboniation (HTC) of different Biomass Feedstocks (e.g. algae)*
- Direct liquefaction of coal and biomass
- *Modelling and simulation of fixed and fluidized bed*
- Energy Systems / examinations on energy chains
- Analytical labs

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- Brief introduction of TU Berlin and Institute of Energy Engineering
- **Junior research group –TCKON**
- Scope of the workshop and the webinars

Junior research group ‚TCKON‘

Fundamental examinations and selective influencing of heterogeneous reactions in thermochemical conversion of biomass and robust, continuous on-line monitoring of the organic load on the gas phase . „NWG-TCKON“

Junior research group funded in the framework of the call of the Federal Ministry of Education and Research (BMBF):

Promotion initiative BioProFi: "Bioenergy – process oriented research and innovation"

In the framework of the promotion concept ‚Fundamental research 2020+‘ and the ‚6th energy research program‘ of the federal government

SPONSORED BY THE

Federal Ministry of Education and Research

The team

Main aims of research group

- **Actively influencing of heterogeneous reactions of gas or vapour with the solid surfaces of carbon structures in the conversion process**
- **Selective influencing and making use of the properties of char generated in the process**
- **Fluorescence of aromatic multi-component mixtures in hot product gases of Thermochemicla conversion processes / development of a robust ‚tar' sensor**

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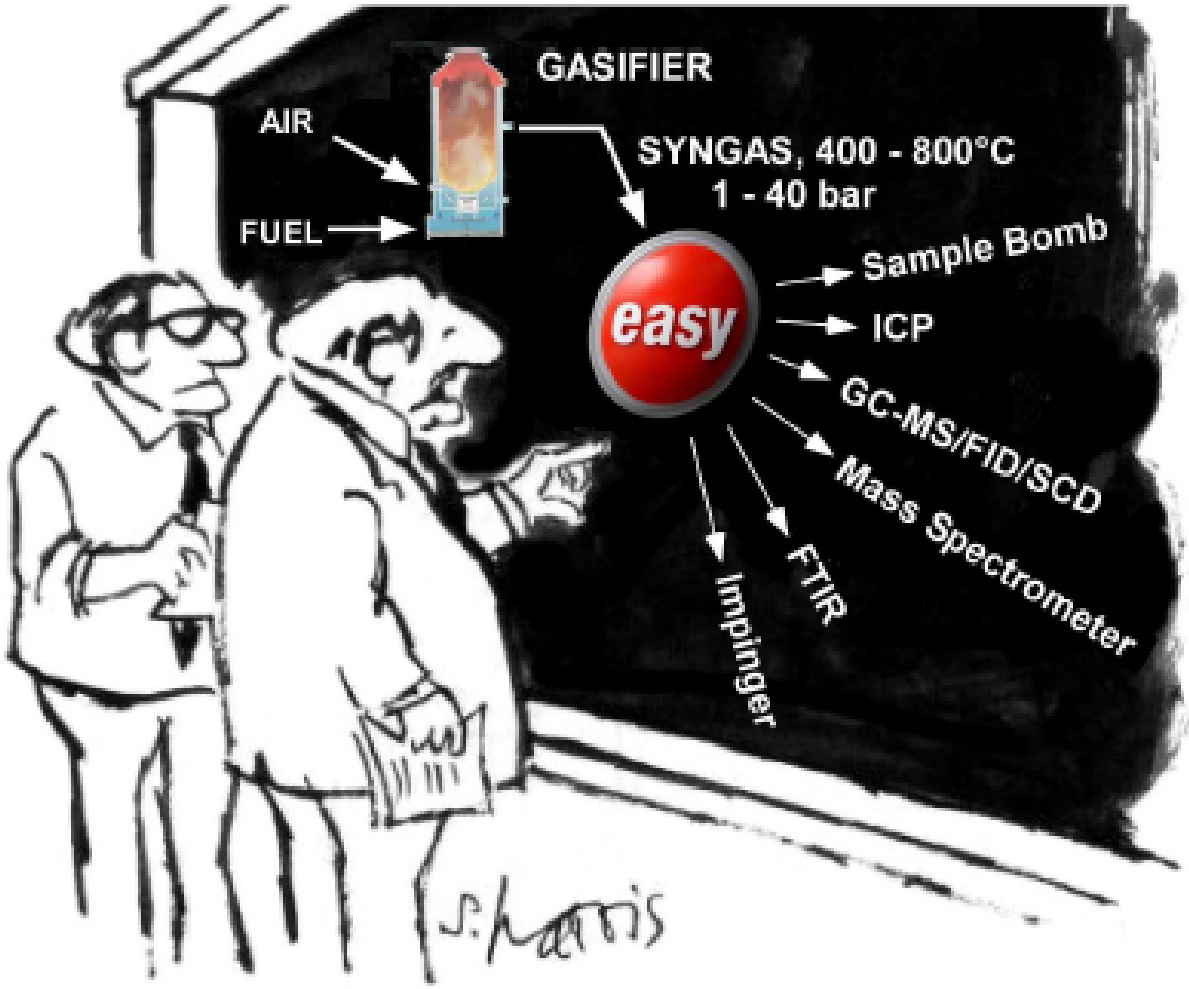


" I think you should be more explicit here in step 2..."

Working group gas analysis - workshops

- Workshop zum Messen von Teer - Teermessung an Holzvergasungs-Motor-BHKW
  Berlin 2010

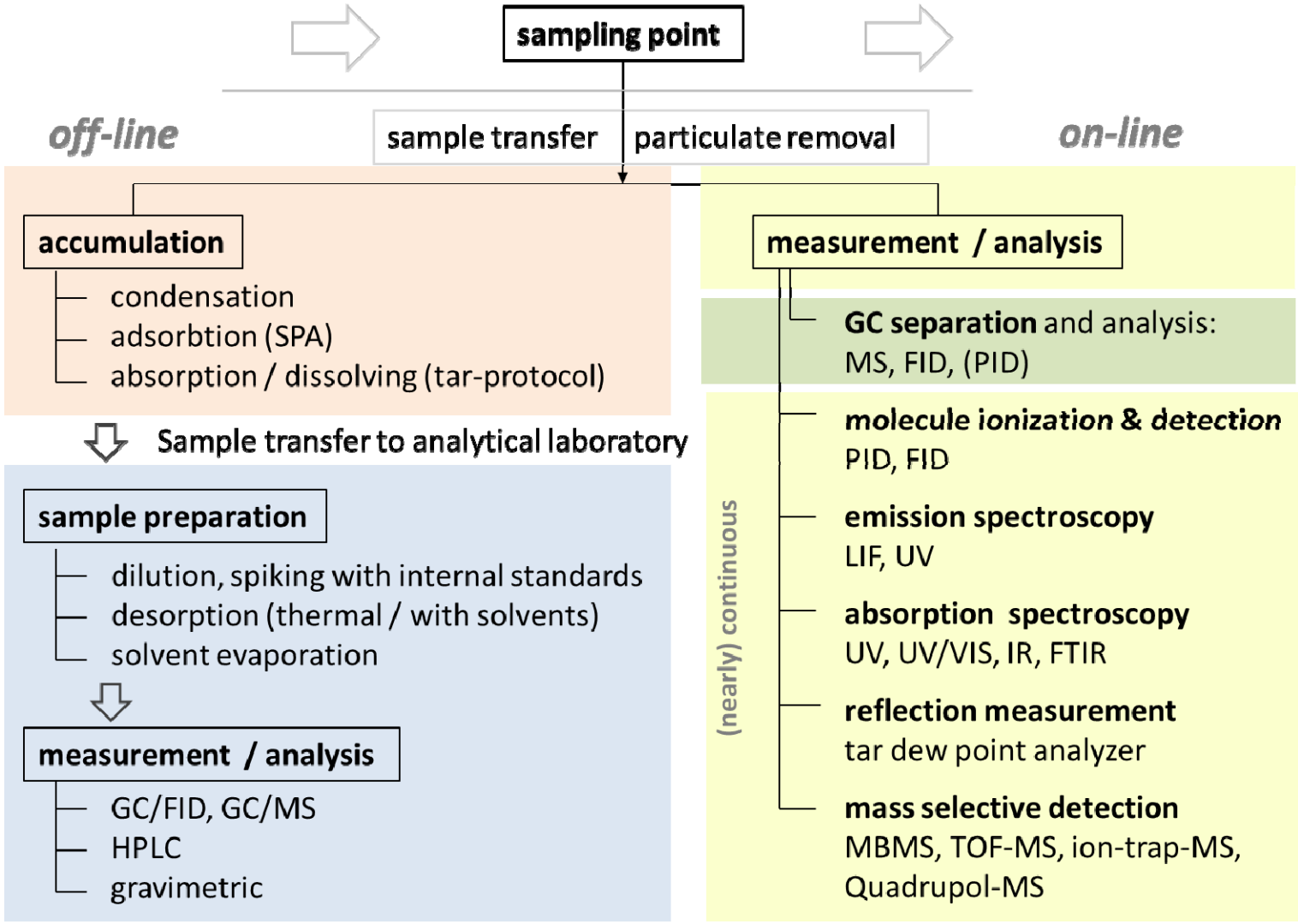
- Measurement, Analysis and Monitoring of Condensable Gas Components (especially Tar) in Product-Gases from Biomass Gasification and Pyrolysis
  Berlin 2011 (EU BC+E)

- Workshop on Sampling, Detection and Quantification of Impurities in Gases from Thermochemical Biomass Conversion Processes - “Gas Analysis Workshop”
  Milan 2012 (EU BC+E)

- Gas Analysis Workshop 2013 - tar & sulphur sampling and analysis
  Copenhagen 2013 (EU BC+E)

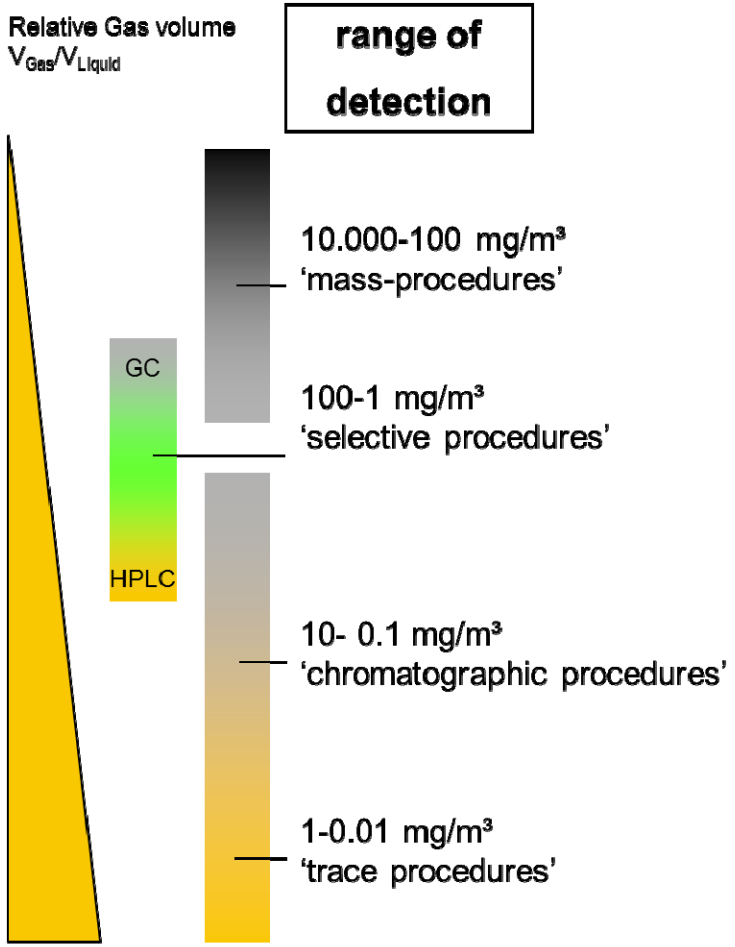
- Gas Analysis Workshop 2014 Berlin
  Berlin 2014

Tar sampling and analysis



Gas sampling and analysis

particle, aerosol, tar	gas family	sampling conditions
particulate	pyrolysis	***crude gas*** high dust, high tar, high water, high temperature
tar for grav.	torrefaction.	
tar for HPLC	up-draft gasifiers	
tar for GC	fluidized bed gasifiers	***treated gas*** medium dust, medium tar, medium water, medium temperature
tar similar comp.	entrained flow gasifiers	
	Down-draft gasifiers	
	staged gasification	
	treated product gas	***finished gas*** low dust, low tar, low water, ambient temperature
	treated synthesis gas	
	flue gas	



Interface connector: sampling-analysis combination

Scientific exchange of knowledge and experience – internation analysis working group

- Workshops

- Webinars

- Collaborative Measurement Campaigns

Topics for webinars:

- **wet chemical sampling and analysis procedures**
- **preparation of round robins**
- **test-gas generators**
- **sulfur analysis**
- on-line methods
- analysis with µ-GC
- FTIR application
- heavy tar analysis
- SPA sampling und analysis
- determination of water content in gases
- …

Thursday April 3rd, 10:45 - 18:00 h

Time	Topic of discussion	Moderator
10:45 – 11:00	Introduction to the workshop	Y. Neubauer
11:00 – 12:00	Review of most relevant applications for diagnostic toolboxes (20 min presentation / 40 min discussion)	M. Kleinhappl
12:00 – 13:00	Generic learning from round robin tests (PSI: Nov. 2013, KIT: March/June 2014) and planed follow up activities (20 min presentation / 40 min discussion)	S. Biollaz
13:00 – 14:00	Lunch break	*local*
14:00 – 16:00	Sampling, sample treatment and analysis for tars and sulphur tars measurement (BTX, PAH, PASH) (30 min presentation / 90 min discussion)	S. Biollaz
16:00 – 16:15	Coffee break	*local*
16:15 – 17:30	Comparative evaluation of different measurement approach for most relevant applications (20 min presentation / 55 min discussion)	M. Kleinhappl
17:30 – 18:00	Perspective of gas analysis working group (21st EBCE **workshop** Hamburg 25./26.6., **IEA** Bioenergy, timeline webinars)	Y. Neubauer
18:00	End of meeting	
19:30 – 22:00	Dinner	

Friday April 4th, 09:00 - 15:00 h

Time	Topic of discussion	Moderator
09:00 – 10:00	Test gas generators and calibration systems (30 min presentation / 30 min discussion)	Y. Neubauer
10:00 – 11:45	Dust measurement in syngas	W. de Jong (S. Biollaz)
11:45 – 12:30	Lunch break	Y. Neubauer
12:30 – 13:30	Water measurement in syngas	M. Kleinhappl
13:30 – 14:00	Sampling, sample treatment and analysis for light C- and S-compounds (C_4 & C_5, H_2S, COS, mercaptan) (15 min presentation / 15 min discussion)	S. Biollaz
14:00 – 15:00	Summary of the workshop and next steps	Y. Neubauer
15:00	End of meeting	

Thank you for your attention!