

Pollutant formation of alternative fuels

**The topic is suitable for**

- ✓ Bachelor thesis
- ✓ Master thesis

**Field of activity**

- Alternative fuels
- Soot precursor formation
- Gas chromatography

**Contact Person**



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The fundamental research in the Cluster of Excellence “The Fuel Science Center” (FSC) aims to integrate renewable electricity with the joint utilization of bio-based carbon feedstocks and CO<sub>2</sub> to provide high-density liquid energy carriers (“bio-hybrid fuels”), which enable innovative engine concepts for highly efficient and clean combustion.

Clean combustion implies the reduction of nitric oxides (NO<sub>x</sub>), carbon monoxide (CO), and unburnt hydrocarbons (uHC), but also particulate matter (PM). The development of alternative fuels allows for minimizing these pollutants before combustion in the engine since they can be tailored to have a low emission potential.

At the Institute for Combustion Technology, we conduct experiments using, among others, gas chromatography-mass spectrometry (GC-MS) and time-of-flight mass spectrometry (ToF-MS) in counterflow diffusion flames to determine the pollutant formation tendency of alternative fuels. The applied techniques enable us to measure stable and unstable species in these flames, focusing on gaseous soot precursors.

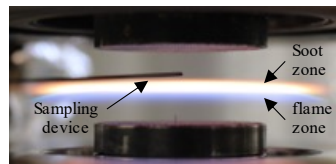


Fig. 1: Counterflow diffusion flame.

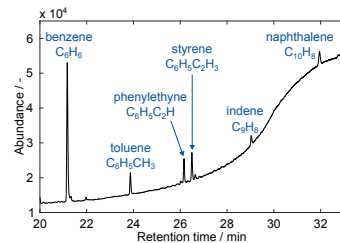


Fig. 2: Chromatogram.

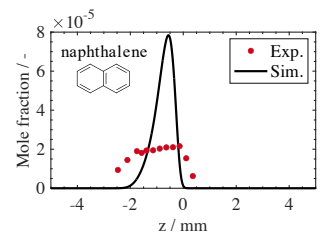


Fig. 3: Naphthalene.

**Your tasks**

- ◇ Conduct, analyze, and evaluate counterflow burner experiments
- ◇ Further development of evaluation routines in MATLAB/Python
- ◇ Flame simulations using our in-house code FlameMaster

**About you**

These tasks may be suitable for you if you:

- ◇ Are self-motivated and are willing to advance your knowledge and skills
- ◇ Enjoy doing experiments
- ◇ Are experienced with MATLAB or Python
- ◇ Are experienced in technical combustion (desirable)

**If you are interested, contact us for more details.**