Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

3.3

SE²A

Measurement of reactive species in complex chemical processes via mass spectrometry and Laser absorption spectroscopy

Project Description

Reduction of greenhouse gas emissions is strictly demanded in all mobility sectors, and therefore sustainable and energy-efficient aviation was proposed in the SE2A excellence cluster. Due to the aircraft's high power and energy density requirements, abandoning a combustion-based propulsion system cannot be directly realized. Therefore, CO_2-neutral aviation fuels are in high demand. As we advance, there are two possibilities; one is to move to hydrogen-based systems where density, storage, and safety issues are driving the research apart from conventional combustion-related research. The second possibility is to use electro fuels that cater to novel combustion systems designs, such as lean-premixed pre-vaporized (LPP) concepts.

In the previous phase of the project, single-component liquid electro fuels were investigated in fundamental reactors (shock tube, rapid compression machine, and jet-stirred reactor) to develop and validate detailed kinetic mechanisms. These models help understand the fuel oxidation pathways, and their reduced form can be coupled with 3D CFD simulation to aid in developing combustors. In the second phase of the excellence cluster, the focus shifts towards more complex fuel blends. Here experiments in fundamental reactors will be carried out for global parameters and time-resolved species information, which will add to a better understanding of the oxidation chemistry of the fuel blends. Investigations will involve liquid-liquid blends, liquid-gaseous fuel mixtures, and the development of their detailed kinetic mechanisms.

Requirements

- Background in mechanical engineering, physical chemistry, or related subjects
- Previous experience in mass spectrometry or laser spectroscopy is an advantage.
- Interests in experimental studies
- Ability to work responsibly and independently
- Female candidate | from non-German university | International

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