

Laser Diagnostics in Combustion

The transformation process towards a CO₂-neutral circular energy economy is one of the great challenges. A smooth transition based on existing distribution infrastructures and thermochemical energy conversion technologies that have proven themselves in the market is associated with lower risk and more predictable investment costs compared to a disruptive technology change, e.g. based solely on electrochemical energy conversion technologies. For this reason, combustion processes such as gas turbines and solid fuel combustion in the electricity industry or combined electro- and thermochemical hybrid drive concepts play a key role in mobility.

In order to realize these promising technology paths on the basis of chemical energy carriers from renewable sources in combination with sustainable and clean combustion technologies in a timely manner, research and development efforts are necessary. Reaching these goals needs the coherent interplay between experiments, theoretical analysis, mathematical modelling and numerical simulation.

An experimental investigation of combustion processes and systems today relies to a great extent on laser diagnostics. Different to most other techniques, measuring by laser light allows for in situ measurements at highest resolution without disturbing the flow. In this lecture the different fields of applications of laser diagnostics are discussed and exemplified by most recent developments. The topics span from investigation of fundamental phenomena, validation experiments, technology development towards robust sensing.



Andreas Dreizler graduated from the University at Heidelberg in Physics (1992) and earned his PhD in Physical Chemistry at the same University. He completed his habilitation in 2002 in Combustion at the Technische Universität Darmstadt. Prof. Dreizler was appointed as chair of the Institute Reactive Flows and Diagnostics at the Department of Mechanical Engineering, TU Darmstadt, in 2008. His research interests include Applied Spectroscopy, Optical Diagnostics, Turbulent Reactive Flows, Fundamental Problems in Combustion. In 2014 he was awarded with the Wilhelm Gottfried Leibniz Price and in 2018 he was elected as Fellow of the International Combustion Institute.