LaVision

We count on Photons

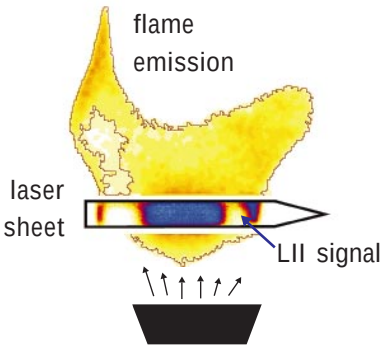
SootMaster

in-situ visualization of particulate matter

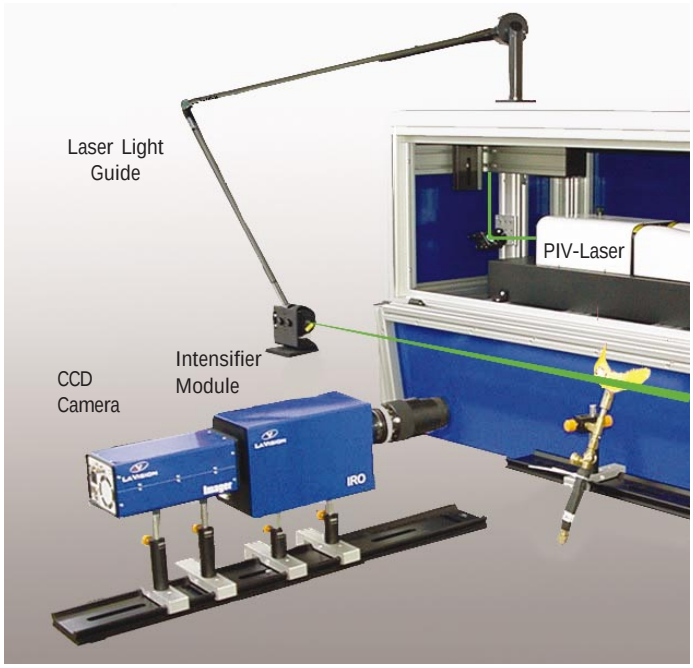
Non-intrusive laser based measurement system for the quantitative visualization of soot volume fraction. The **L**aser-**I**nduced **I**ncandescence (LII) signal of laser heated particles is used to measure the particle concentration (volume fraction) with high temporal and spatial resolution. Instantaneous concentration maps are recorded using a fast shutter camera synchronized to the laser pulse. The primary particle size distribution can also be derived from LII signals.

information

- **instantaneous particle concentration fields** with statistics (mean and rms values)
- **primary particle size distribution**



soot map of a propane fan burner with flame emission background

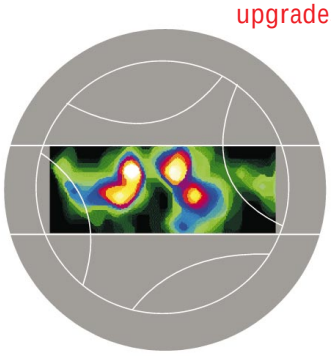


combined LII & PIV system

upgrades

SootMaster can be readily upgraded with other light sheet imaging techniques to gain additional information about (reactive) flow fields:

soot	→ **LII**
chemistry	→ **LIF, Raman, Emission**
flow field	→ **PIV**



courtesy: LTFD & VKA, RWTH Aachen

soot formation in a Common Rail 2l diesel engine

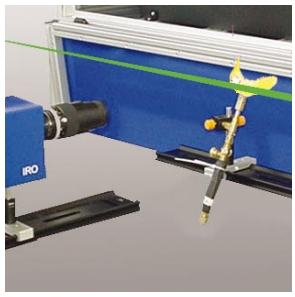
features

- on-line soot volume fraction (primary particle size) imaging
- high sensitivity (low detection limit) with large dynamic range
- high temporal (<10ns) and spatial resolution
- light sheet and image correction
- signal calibration using light extinction or reference sources

LaVision GmbH
Anna-Vandenhoeck-Ring 19 / D-37081 Goettingen / Germany
E-Mail: Info@LaVision.de / www.LaVision.de
Tel.: +49-(0)5 51- 90 04- 0 / Fax: +49-(0)5 51- 90 04- 100

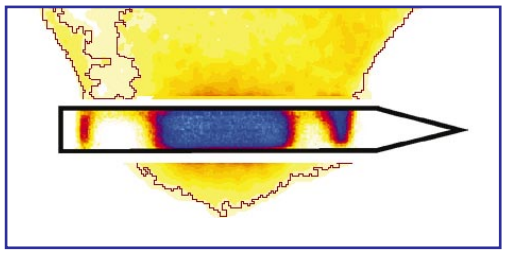
LaVision Inc.
301 W. Michigan Ave. / Suite 403 / Ypsilanti, MI 48197 / USA
E-mail: sales@lavisioninc.com / www.lavisioninc.com
Phone: (734) 485 - 0913 / Fax: (240) 465 - 4306

SootMaster



focus on particulate matter emissions:
automotive engines
flames
turbines

The laser light sheet imaging system **SootMaster** is designed for in-situ and real-time characterization of soot emissions in diesel and direct injection spark ignition engines, gas turbines, flames and various kinds of metal or ceramic particle flows.



LII light sheet imaging

LII is orders of magnitude more sensitive than standard gravimetric techniques allowing detection of ultra low particle emissions of modern car engines even under transient conditions.

operating principles

Laser-Induced Incandescence (LII) is applied using intense laser light sheet illumination slicing the (reactive) particle flow at user defined locations. The particles within the light sheet are heated up to the carbon evaporation temperature (> 4000K). The resultant incandescence (blackbody emission) of the heated particles is detected with a fast shutter camera synchronized to the laser pulse. Appropriate filtering and time-gating of the LII emission assure accurate soot volume fraction measurements. Primary particle size distributions can be derived from LII signal ratios. LII signal calibration is carried out in combination with reference sources of known particle concentrations or in combination with line-of-sight extinction methods. Light sheet scanning can be applied for 3-dimensional measurements.

system components

The system consists of a high power pulsed laser, a light sheet generator for light sheet illumination, a photometric fast shutter CCD camera system, imaging optics with filter, PC with interface cards and the **SootMaster** image acquisition, data processing and visualization software.

customized solutions

Customized systems and upgrades are offered for application-specific measurements.

LaVision GmbH
Anna-Vandenhoeck-Ring 19 / D-37081 Goettingen / Germany
E-Mail: Info@LaVision.de / www.LaVision.de
Tel.: +49-(0)5 51- 90 04- 0 / Fax: +49-(0)5 51- 90 04- 100

LaVision Inc.
301 W. Michigan Ave. / Suite 403 / Ypsilanti, MI 48197 / USA
E-mail: sales@lavisioninc.com / www.lavisioninc.com
Phone: (734) 485 - 0913 / Fax: (240) 465 - 4306