

Physical Technique | Technology Offer

## Laser optical spark plug sensor

### Field of application

For the development of modern combustion engines it is important to have precise knowledge of the processes in the combustion chamber. In this context the measurement of e.g. fuel distribution, temperature or air-fuel ratio is a difficult and complex task, which has to be solved. As a solution to this measurement task optical methods based on laser-induced fluorescence (LIF) can be used.

### Drawback of currently available technologies

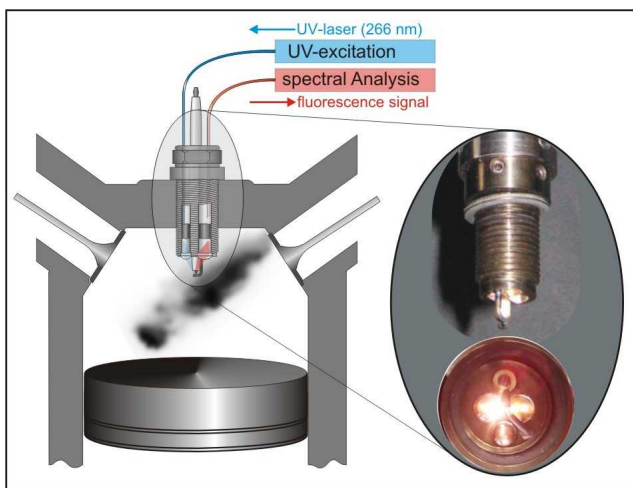
To realize LIF-measurements with conventional procedures specially modified engines are necessary. The production of such engines is time consuming and cost intensive. Additionally, the technical necessary modifications can even influence the physical and chemical properties of the examined object and falsify the measurement result.

### Secure your innovation advantage

In a cooperation of the Universität Heidelberg and Universität Stuttgart a new system was developed, which enables minimal invasive measurements of tracer LIF-signals by a combination of fibre and microoptical elements integrated into a fully functional spark plug.

### Patent situation

A German patent DE 10 2005 028113 B4 is in force.



Fully functional spark plug with integrated measurement optics.

### Innovation

The invention relates to a novel measurement system, which uses spectral analysis of LIF-signals to gain information about fuel distribution, temperature or air-fuel ratio in the combustion chamber of close-to-product engines. The crucial factor is the innovative construction of the fibre and microoptical system in combination with most advanced detection and analysis methods of the fluorescence signals. For generation of fluorescence signals natural components of regular fuel can be excited or for quantitative measurements well-characterized fluorescent tracers are added to otherwise non- (or weakly) fluorescent fuels. The construction of the optical system allows measurements in a user-defined 2 mm<sup>3</sup> volume close to the ignition spark. Depending on the Laser applied also time resolved measurements are possible.

The optical measurement system can also be used in combination with other measurement methods as e.g. spark emission diagnostics or the observation of flame luminosity.

### Your advantages at a glance:

- Most advanced laser-induced fluorescence (LIF) measurement methods.
- Improved measurement results by measurements on close-to-production engines without modifications of the combustion chamber.
- Remarkable reduction of expenditure of time and money for engine development as no modified engines are necessary.
- Time resolved measurements are possible.
- Additional optical measurement methods can be integrated.

### Technology transfer

The Technologie-Lizenz-Büro GmbH (Germany) on behalf of the Landesstiftung Baden-Württemberg gGmbH offers interested companies the opportunity to acquire an appropriate licence for this innovative technology. Furthermore, the research group offers cooperation for further joint development.

For further information on “**spark plug sensor**” please contact Mr. Michael Ott at [ott@tlb.de](mailto:ott@tlb.de)

Technologie-Lizenz-Büro (TLB)  
der Baden-Württembergischen Hochschulen GmbH

Ettlinger Straße 25, D-76137 Karlsruhe, Germany  
phone ++49 (0)721 79004-0, fax ++49 (0)721 79004-79  
[www.tlb.de](http://www.tlb.de)