

## Laser-based investigation of sooting combustion of additized Diesel fuel

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The reduction of soot emission from diesel combustion, affecting human health and climate change, is influenced not only by combustion conditions but also by the chemical fuel composition. In this work, the effects of oxygenated diesel additives on the soot emission were investigated by various techniques. A newly developed burner for the pre-vaporized combustion of diesel fuel in a laminar diffusion flame allows to suppress effects dominant in internal combustion engines such as spray-propagation and evaporation and to selectively work out the effects of additives. While the development of the soot concentration was investigated using Laser-induced Incandescence (LII) in an imaging approach for 2D-measurements, the size of the soot aggregates was determined by Wide Angle Light Scattering (WALS) at certain flame positions. Further mobility-measurements with a SMPS were carried out for the determination of the aggregate size distribution. The additives studied include Tripropylene Glycol Methyl Ether (TPM) and Oxymethylene Ethers (OME), specifically OME<sub>2</sub> and OME<sub>3-5</sub>, which were inserted in different concentrations to a reference diesel.

The experimental results we present display the reduction effect of the additives on the soot formed (particularly of OMEs), especially in the oxidation region of the flame, as well as the influence on the aggregate size of the particles.

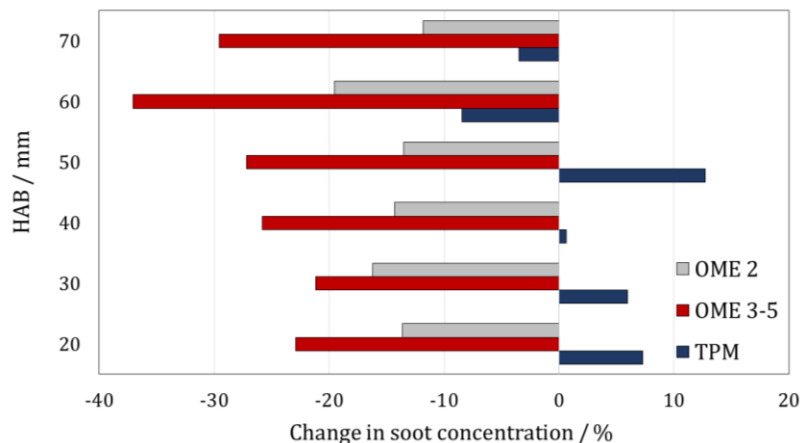


Fig. 1. Soot reduction effect (relative to the reference diesel) of TPM, OME<sub>2</sub> and OME<sub>3-5</sub>. The concentration of the additives is 3% v/v in the reference diesel.