

SUPPORTING INFORMATION

On source identification and alteration of single diesel and wood smoke soot particles in the atmosphere; an x-ray microspectroscopy study

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1. Engines operation

The jeep and passenger car were run on a chassis dynamometer under steady state conditions at 80 kmh⁻¹. The two vehicles represent two very different diesel engine technologies. The jeep was equipped with 3.5 l engine with an obsolete swirl chamber system without turbo charger. The passenger car had a state-of-the-art 1.9.l turbo-charged diesel engine with direct injection. The 6-cylinder truck engine was operated at moderate engine load on a test bench.

2. STXM details

The PolLux experiment uses linearly polarized X-rays from a bending magnet of the 2.4 GeV storage ring in the photon energy range between 200 eV and 1400 eV and it provides a spatial resolution better than 40 nm and spectral resolving power $E/\Delta E > 5000$ at the N K-edge. The photon energy was calibrated by setting the maximum of the well resolved 3p Rydberg peak of gaseous CO₂ at 294.96 eV. The data were acquired in the transmission mode in He atmosphere. C(1s) spectra were obtained from particles as small as 100 nm by averaging data of line scans with a step size of 20 nm and a dwell time of 10 ms. Spectra were taken between 280 and 300eV, with a step size of 0.1eV. The spectral data were extracted from the line scans using IDL-routine aXis2000 (1) and smoothed using the Lee-Filter in the routine. All spectra shown in this paper have been normalised by the intensity at 300eV after subtracting the background value at 280eV. Futhermore, the maximum absorbance (optical density, OD) in the measured spectra was less than 0.3 OD units.

References

(1) <http://unicorn.mcmaster.ca/aXis2000.html>