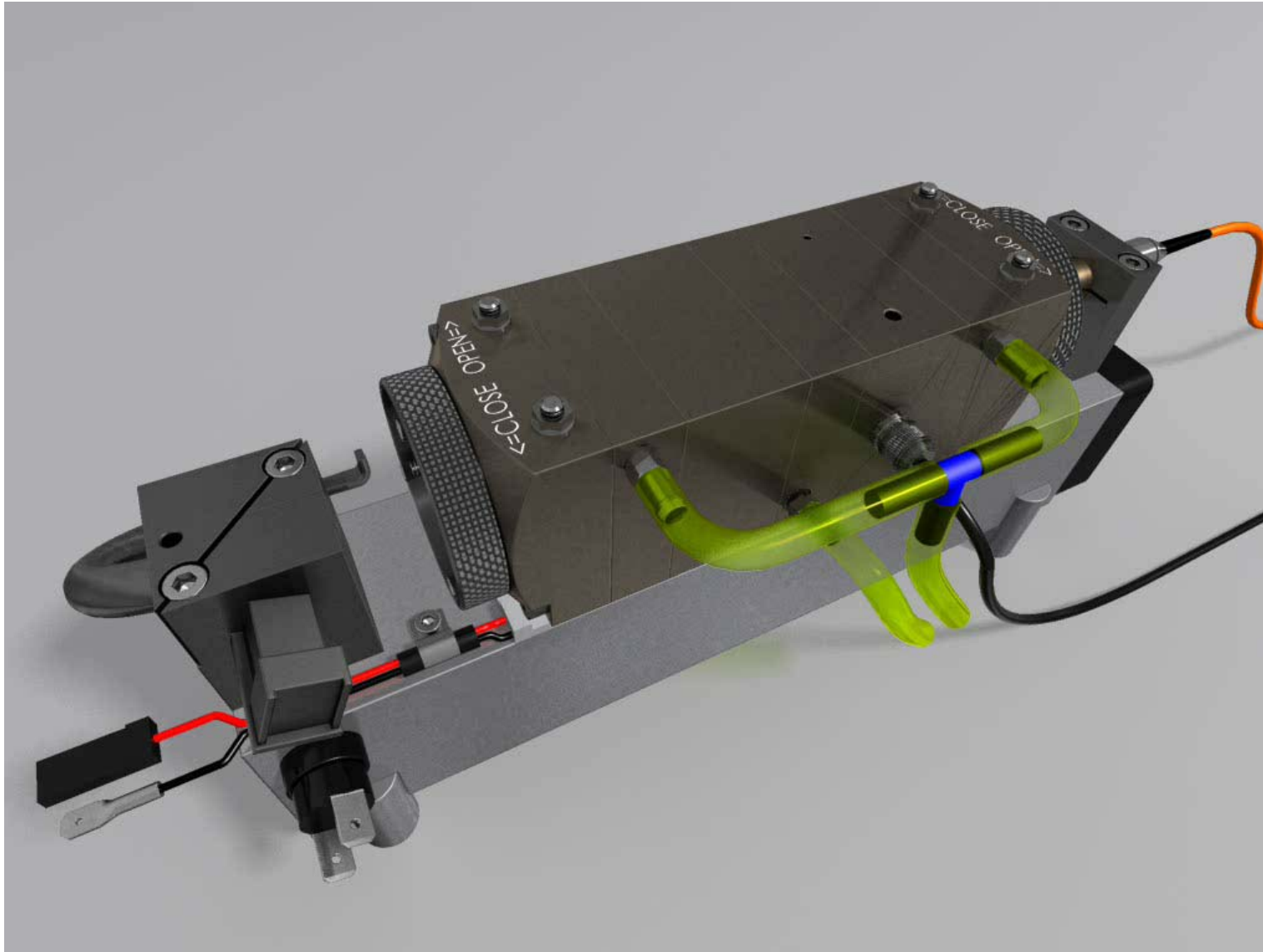




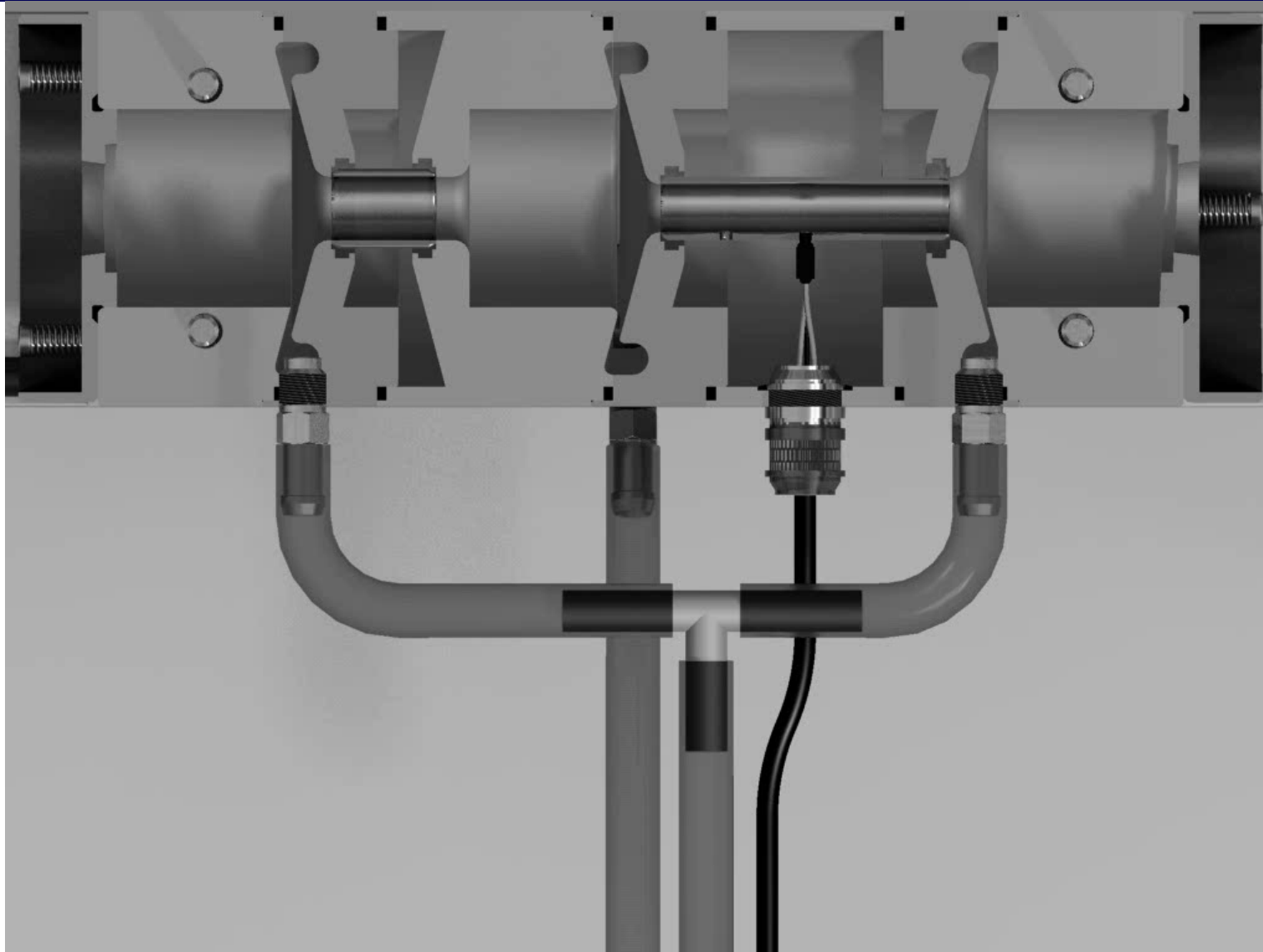
Online Soot Measurement – AVL Micro Soot Sensor



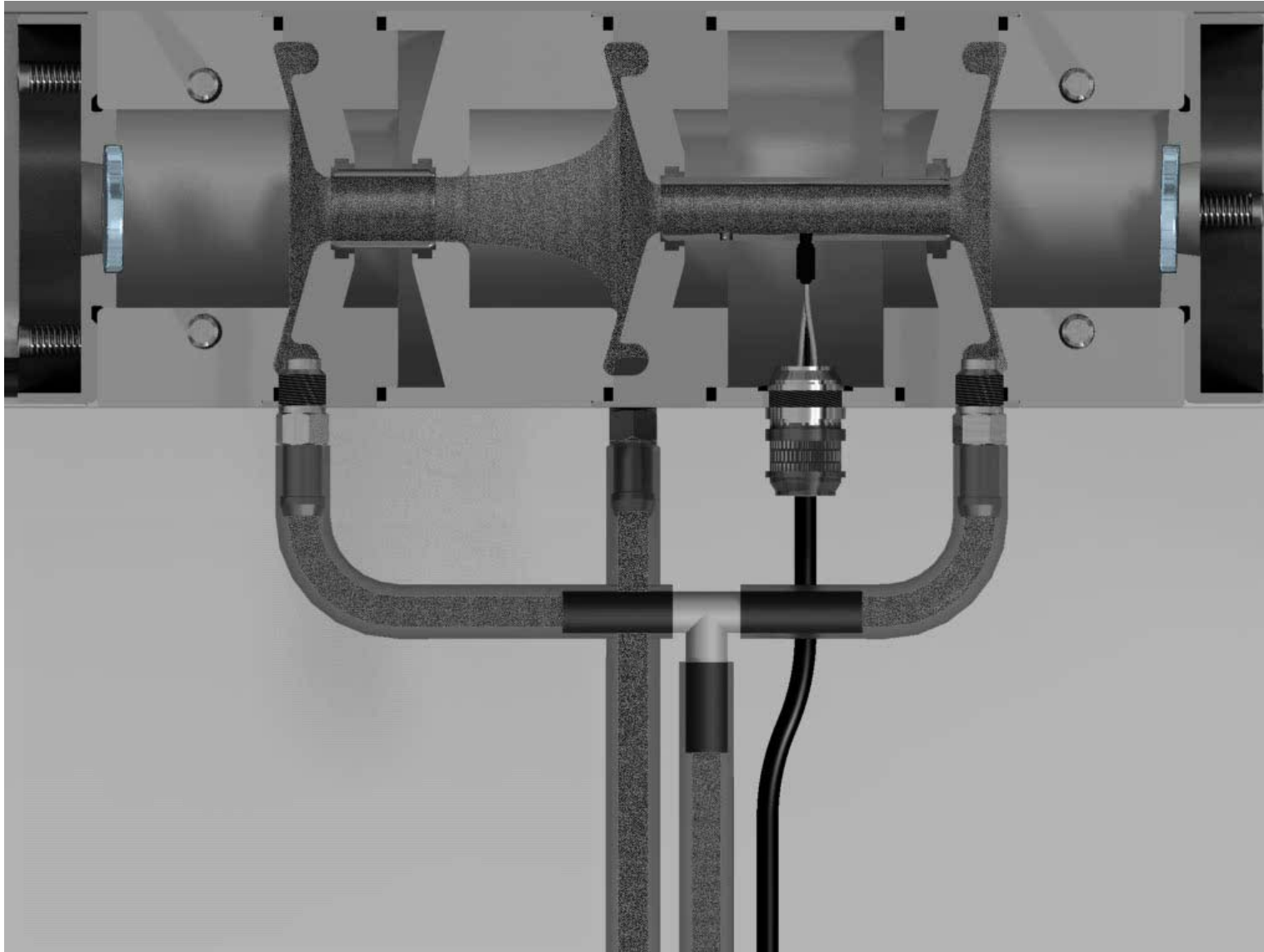
Measurement and Functional Principle



Measurement and Functional Principle



Measurement and Functional Principle





▪ R&D Application (test cell and in-vehicle)

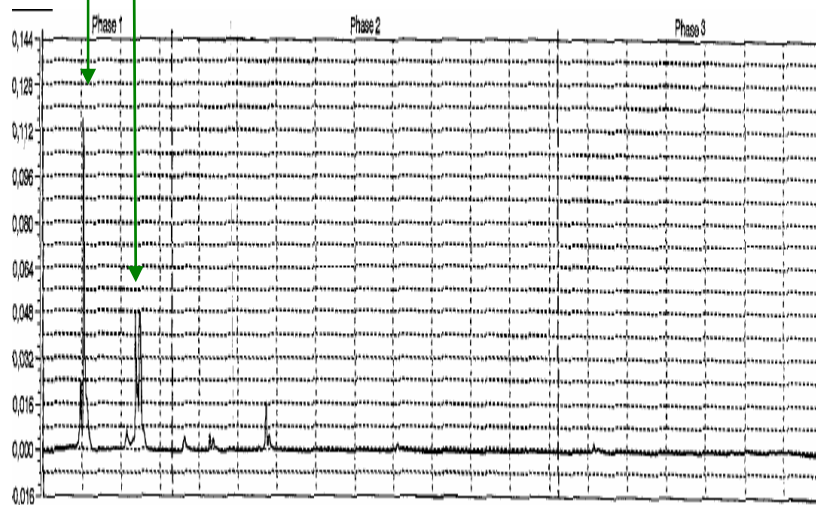
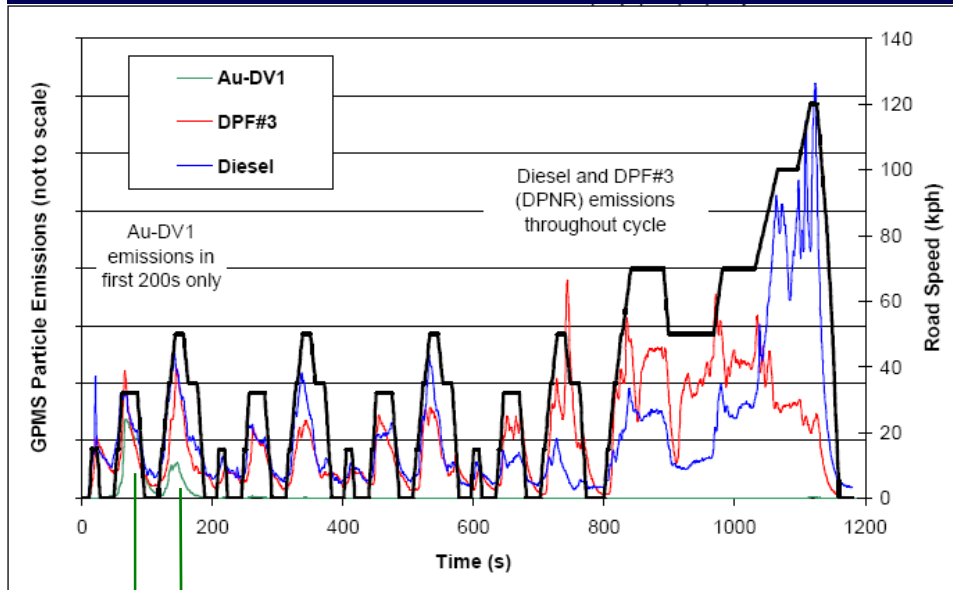
- Optimization of combustion and exhaust aftertreatment system
- DPF Efficiency testing
- Durability and lifecycle testing
- Cold start optimization (also GDI)
- Filter loading, filter regeneration strategy

▪ In-Use Conformity testing (in-vehicle)

- In-Use Conformity Testing (U. S.)
- In-Service Conformity Testing (EU)



Online Soot Measurement



**Particle Emissions of 3 different Diesel Cars with DPF over NDEC cycle.
(PMP “Interlaboratory Exercise”)**

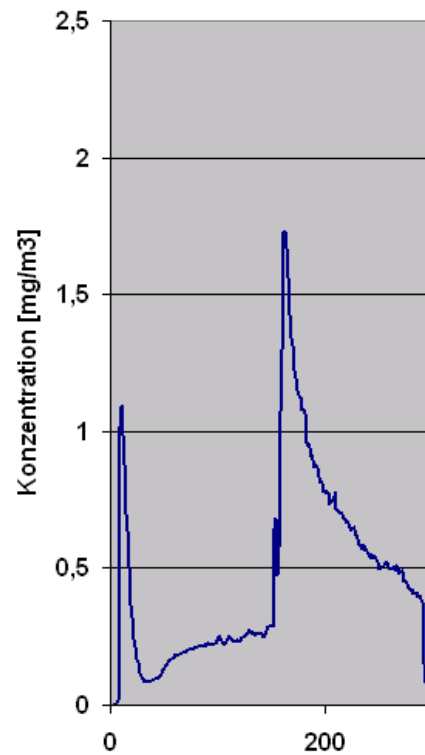
The 483 can detect the porous DPF and distinguish between a good and a bad DPF

particulate/soot emissions characteristic in the NEDC of a DPF equipped vehicle measured with AVL 483

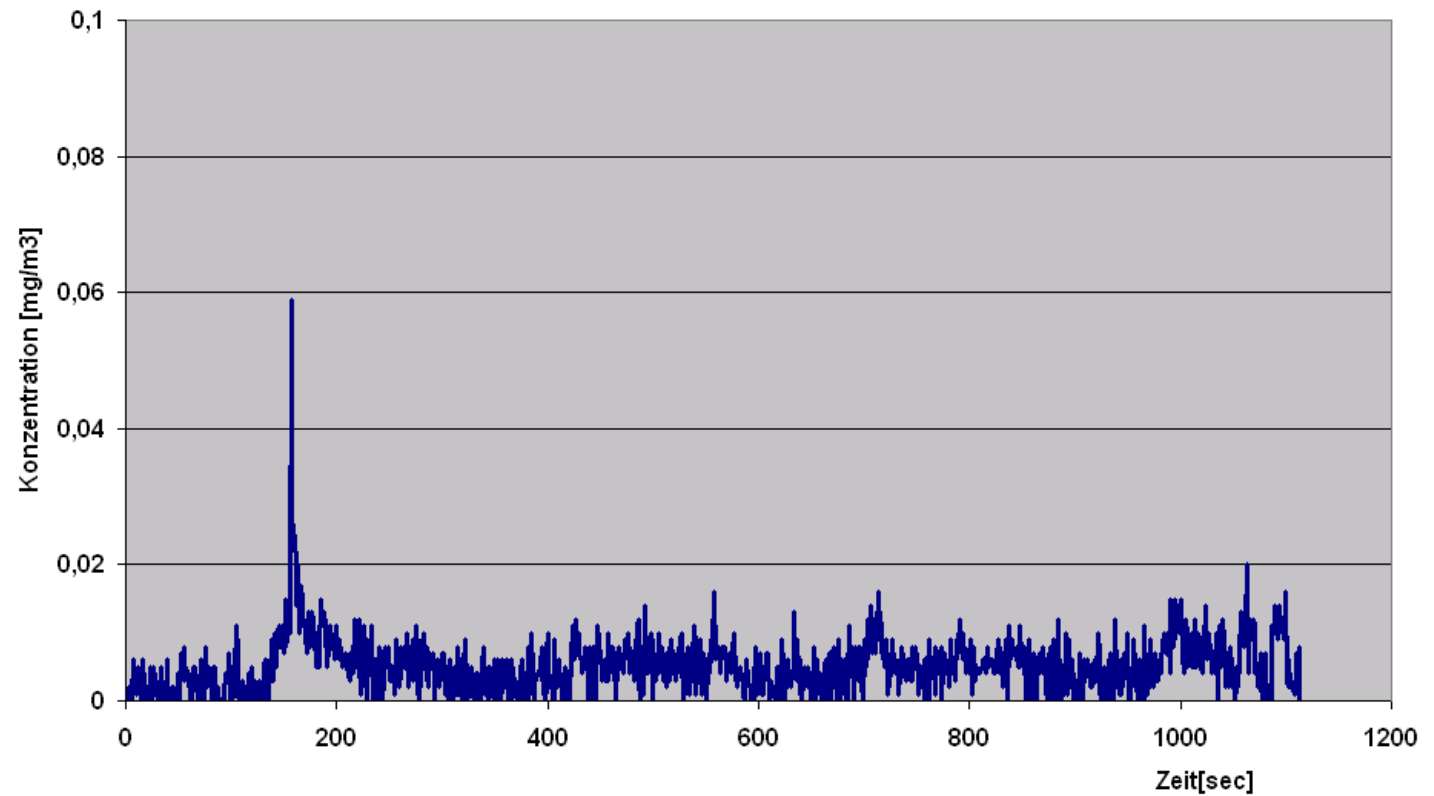
Evaluation of DPF Efficiency



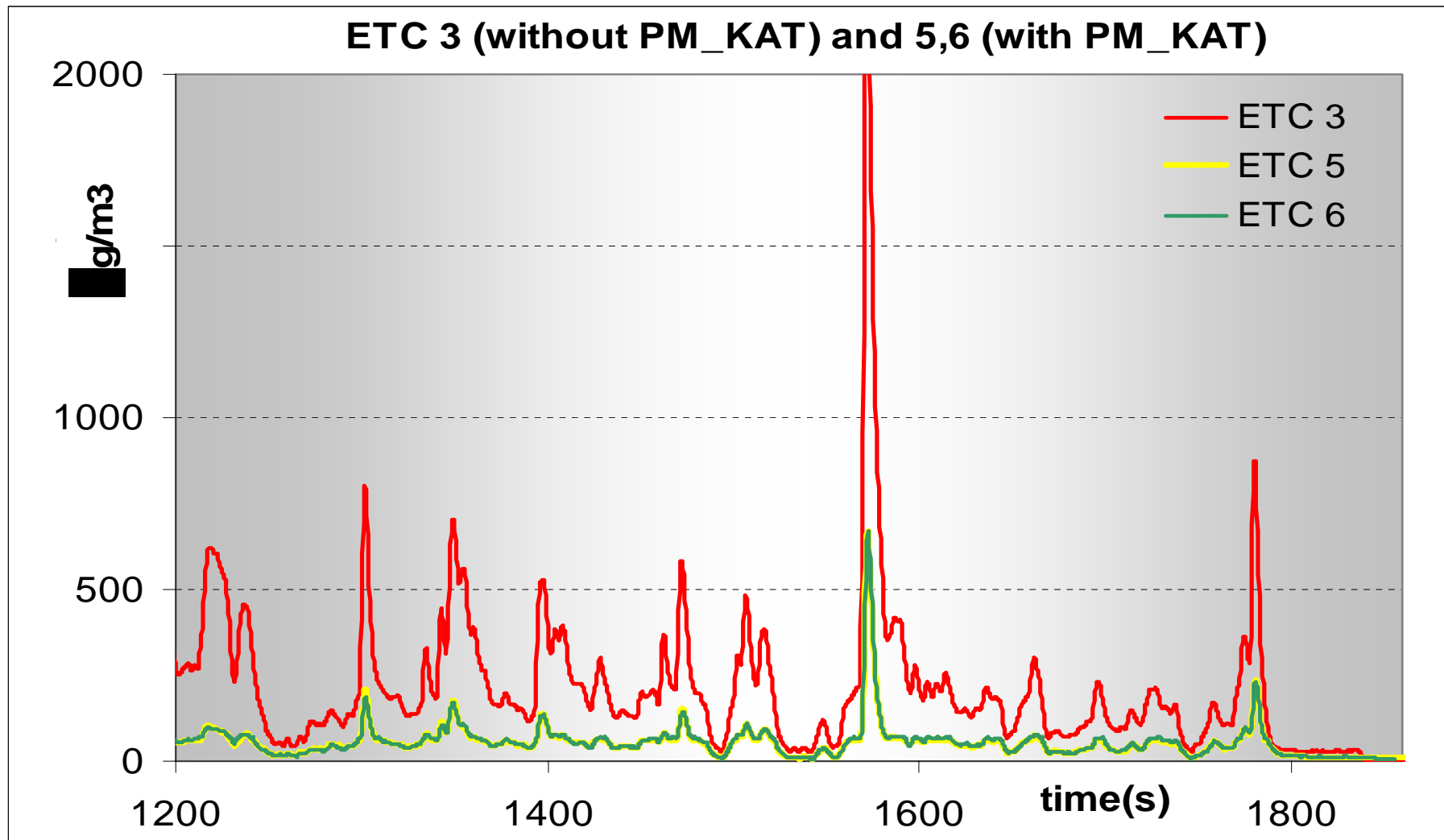
Leerlaufmessung



Leerlaufmessung und freie Beschleunigungen Fahrzeug 3 mit PM Filter



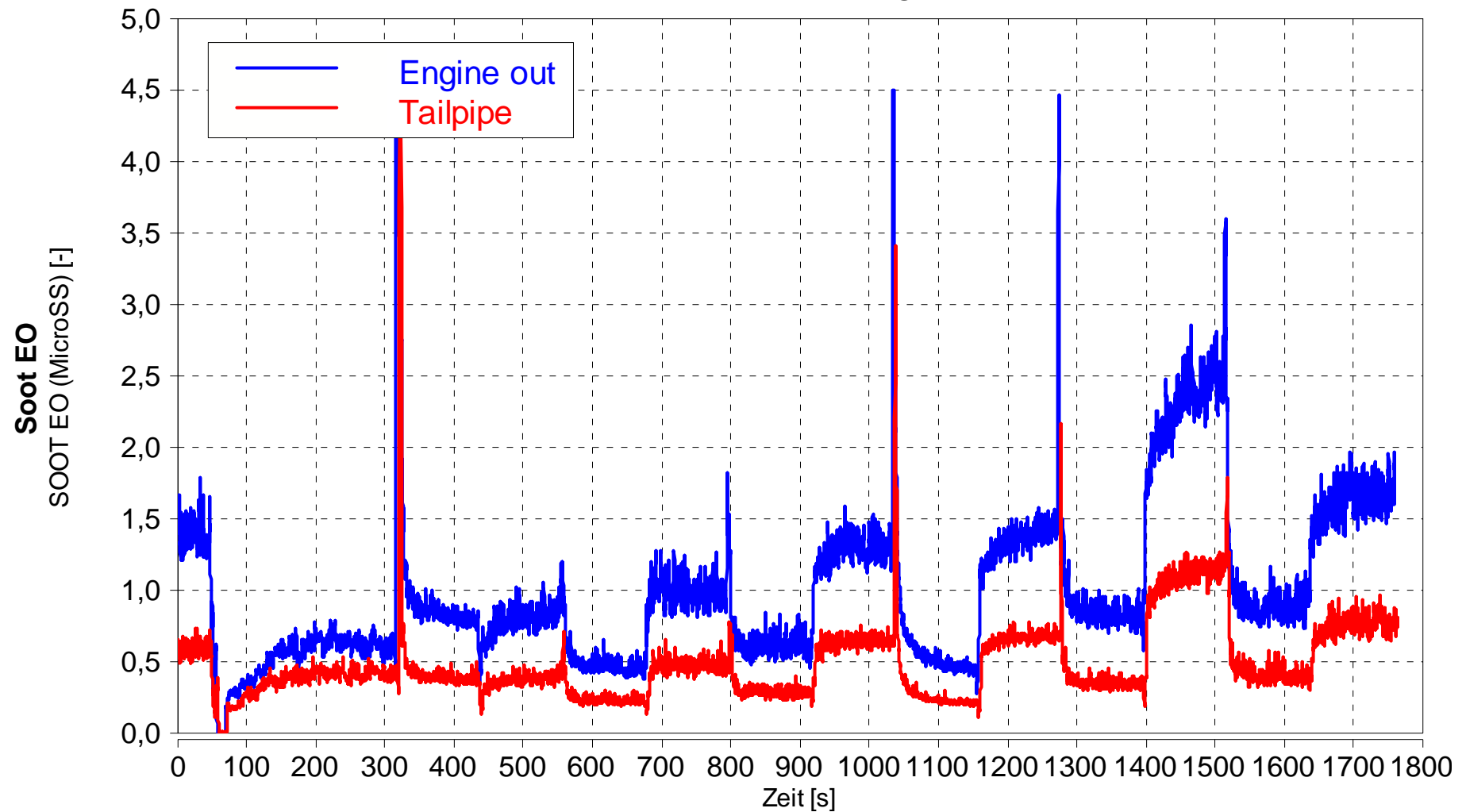
Evaluation of DPF Efficiency



Evaluation of DPF Efficiency



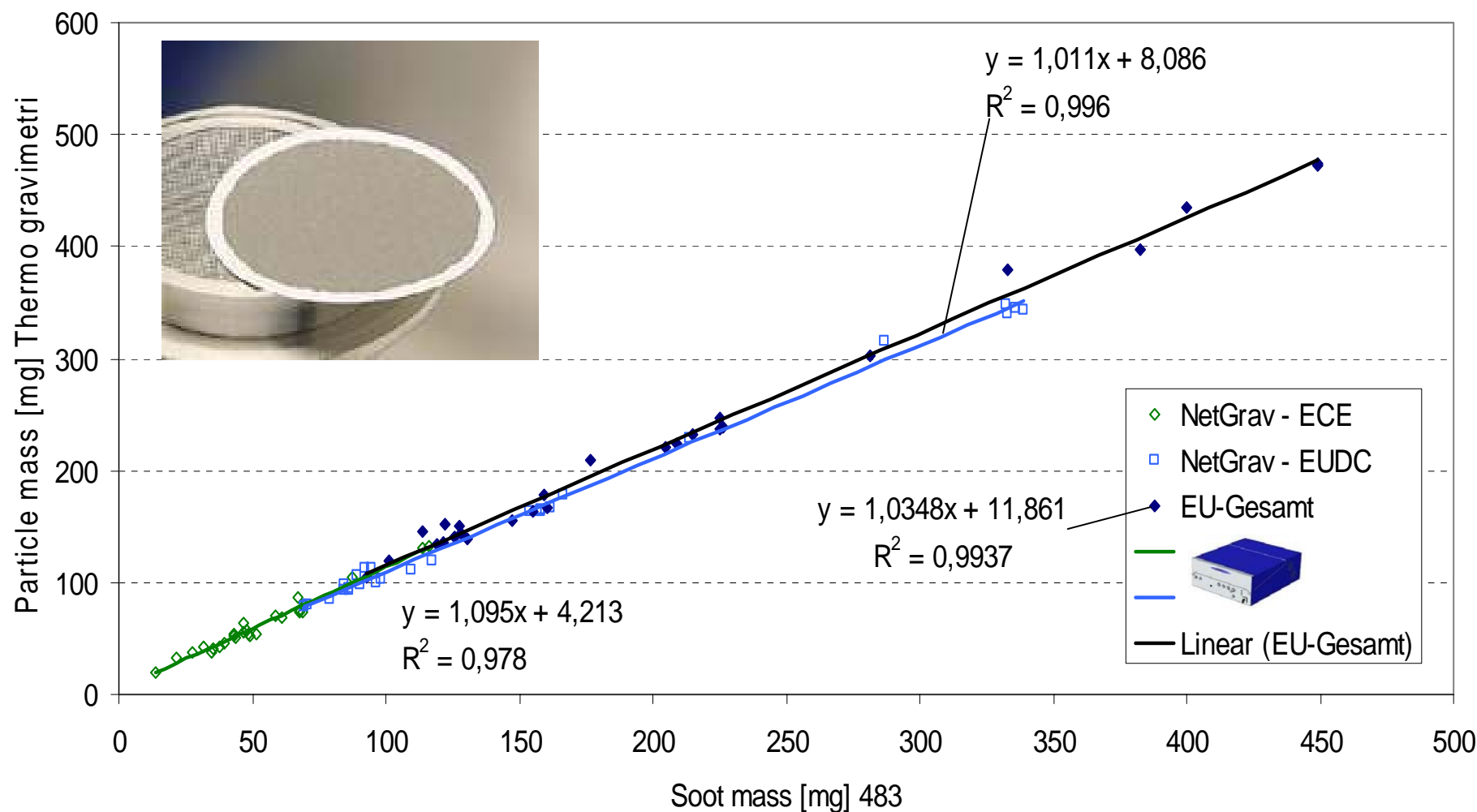
MicroSoot Sensor: Soot [g/m³]



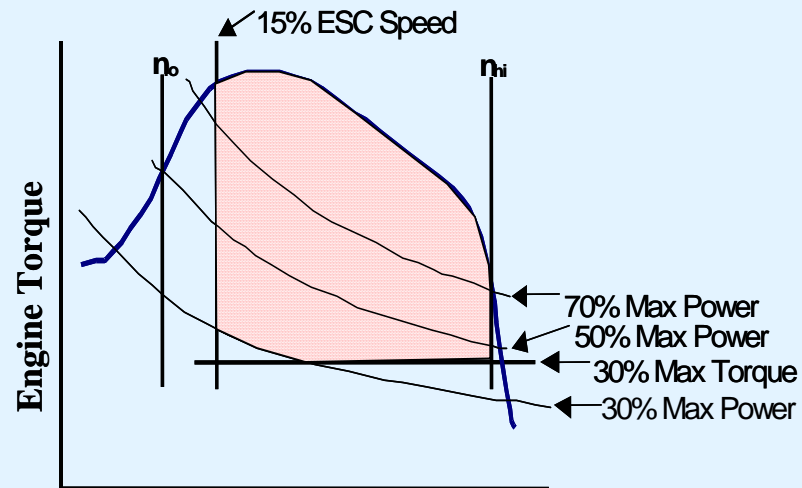
Correlation - AVL Micro Soot Sensor vs. Gravimetrie



Correlation Soort - Thermo gravimetric



Micro Soot Sensor for mobile Application



- **Vehicle Optimization on the Road**
- **In-Use Conformity**



CeCert Tests at University of Riverside (LA)



- **Correlation tests on the road (2 weeks)**
 - Mobile Lab, Horiba (PFSS + EAD), Sensors PPMD (MPS, QCM), AVL MSS
- **Gathering first experience with the application and instruments**
- **All equipment had to be mounted outside cab**

CeCert Tests at University of Riverside (LA)



Semtech – Micro Soot Sensor SW Integration



Navigator SENSOR Tech-PC Version: 10.08

SENSOR TECH-PC

Home

System Setup

Status

Test

Data Analysis

Tech Support

Configure

FID Control

Leak Test

Zero

Audit

Span

Options Vehicle Interface Auto-Zero Temperatures DACs DIOs MSS

AVL Micro Soot Sensor

Device Control

On

Configuration

Rate 1000 ms

Range 100 mg/m3

IIR Filter Constants

Concentration 0.000

Dilution Ratio 0.000

Data Display

Concentration (mg/m3) **0.7488**

Dilution Ratio **4.0472**

Adjusted Concentration (mg/m3) **3.03034**

- For DPF equipped vehicles measurements with the gravimetric filter method show more or less data noise.
- In contrast to the gravimetric filter method alternative methods can discriminate between “good” and “not so good” DPF functioning.
- The Micro Soot Sensor is a very sensitive alternative method, which:
 - ❖ can quantify emissions even after DPF.
 - ❖ is calibrated versus gravimetric soot emissions.
 - ❖ shows good correlations to gravimetric measurements in several laboratories in Europe and the US.
 - ❖ has been successfully used in the European PEMS project
 - ❖ is the DEKRA reference system.
 - ❖ was successfully tested in the CARB-UCR program.



- **Fulfills most important requirements for Research and Development and in-use Application**

- Test cell and mobile use
- High data rate and fast response time
- Sensitive to soot only
- Low detection limit
- Durable to operate in high-soot engine application
- Good repeatability and correlation to regulatory gravimetric method

▪ **Thanks a lot for your attention!**