
Smoke particle sensors for OBD and high sensitive Measurements



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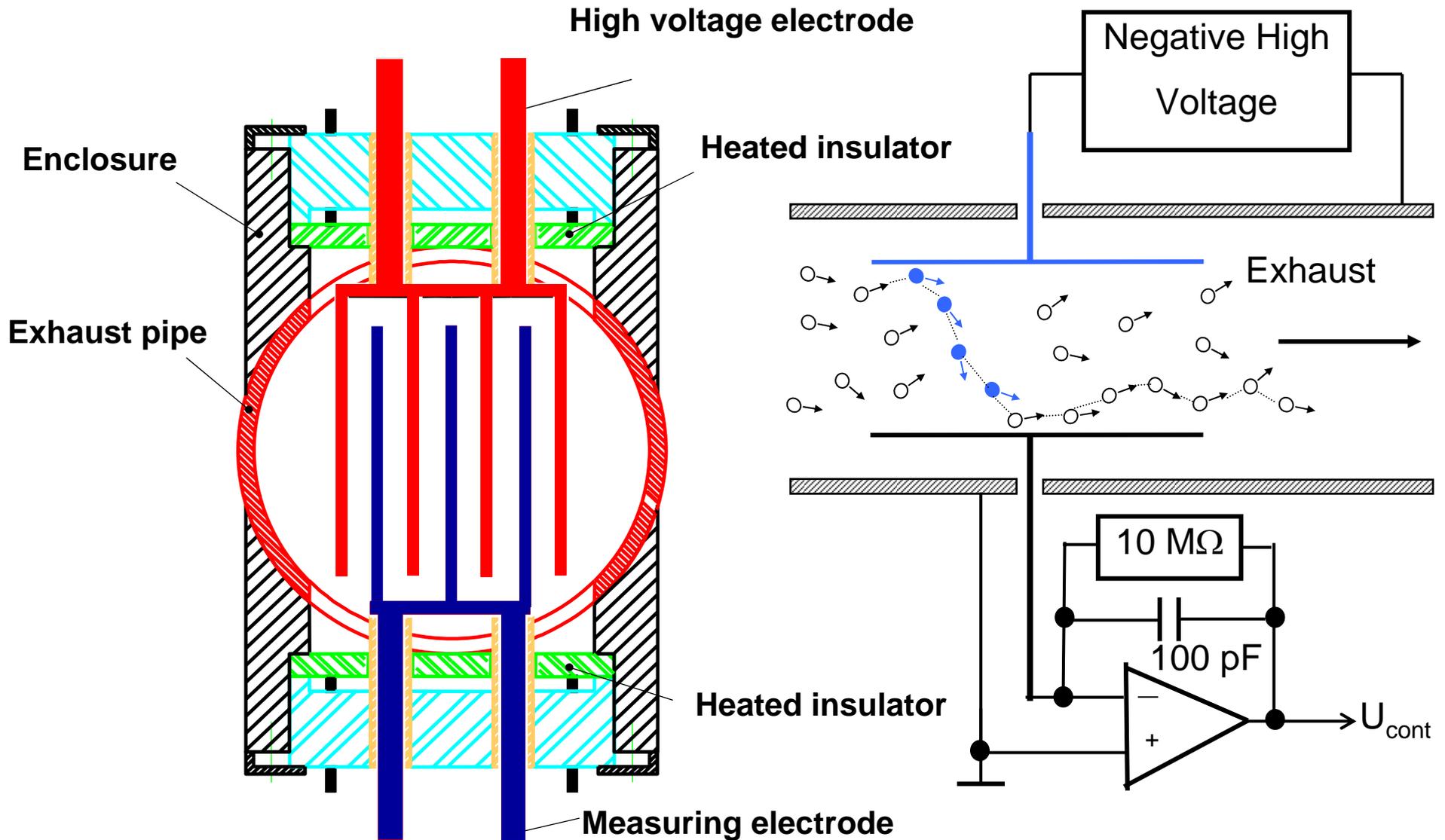
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SOLUTIONS GBR

Introduction

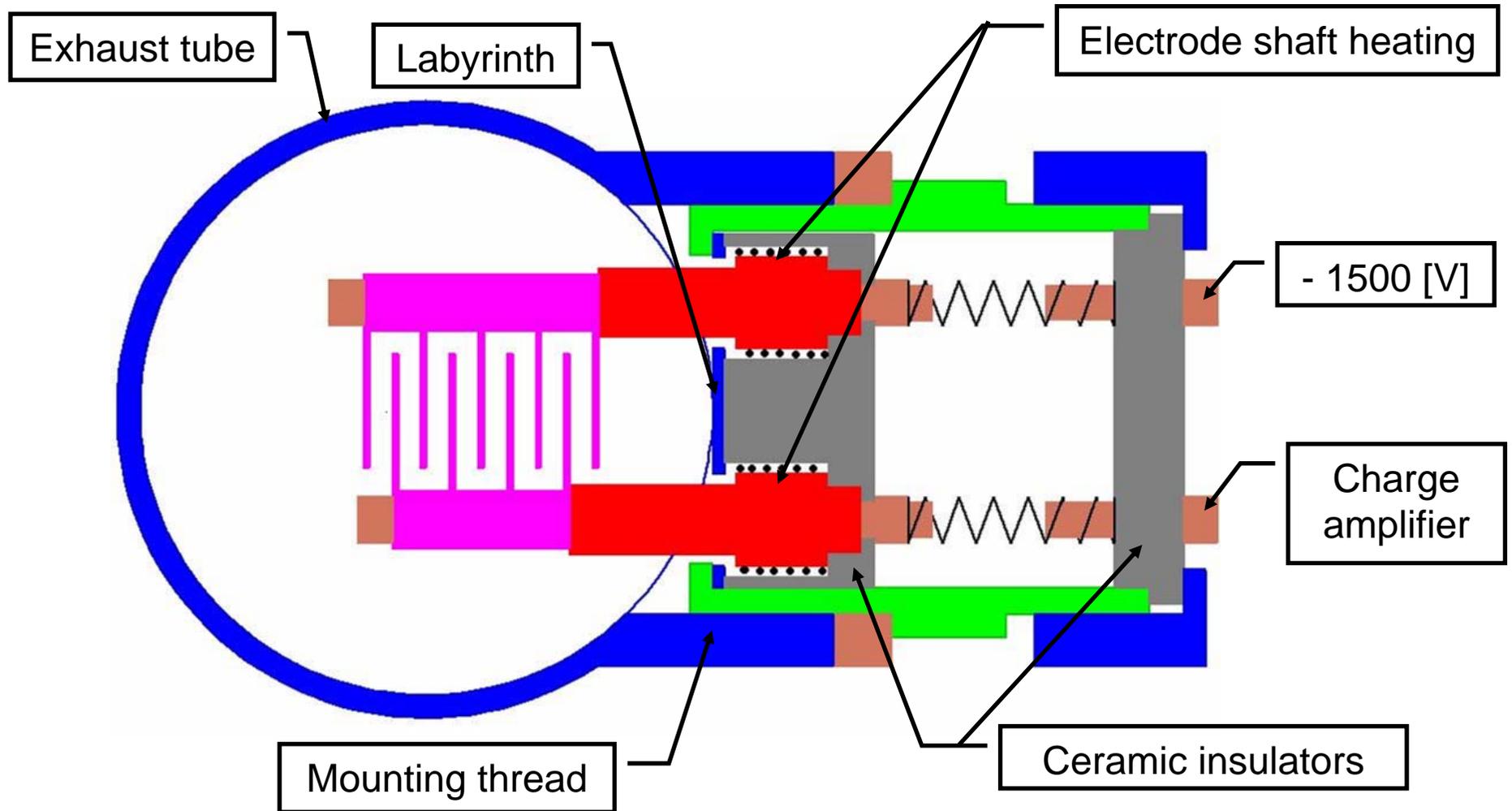
1. Soot charging sensor for OBD, approved sensitivity: $200 \mu\text{g}/\text{m}^3$
2. Soot charging sensor as measuring instrument of high sensitivity
noise level in total: $0,5 \mu\text{g}/\text{m}^3$
1. Soot impedance sensors for OBD, approved sensitivity: $10 \text{mg}/\text{m}^3$

Focused on applications for OBD and periodical inspections of vehicles supplied with particle traps.

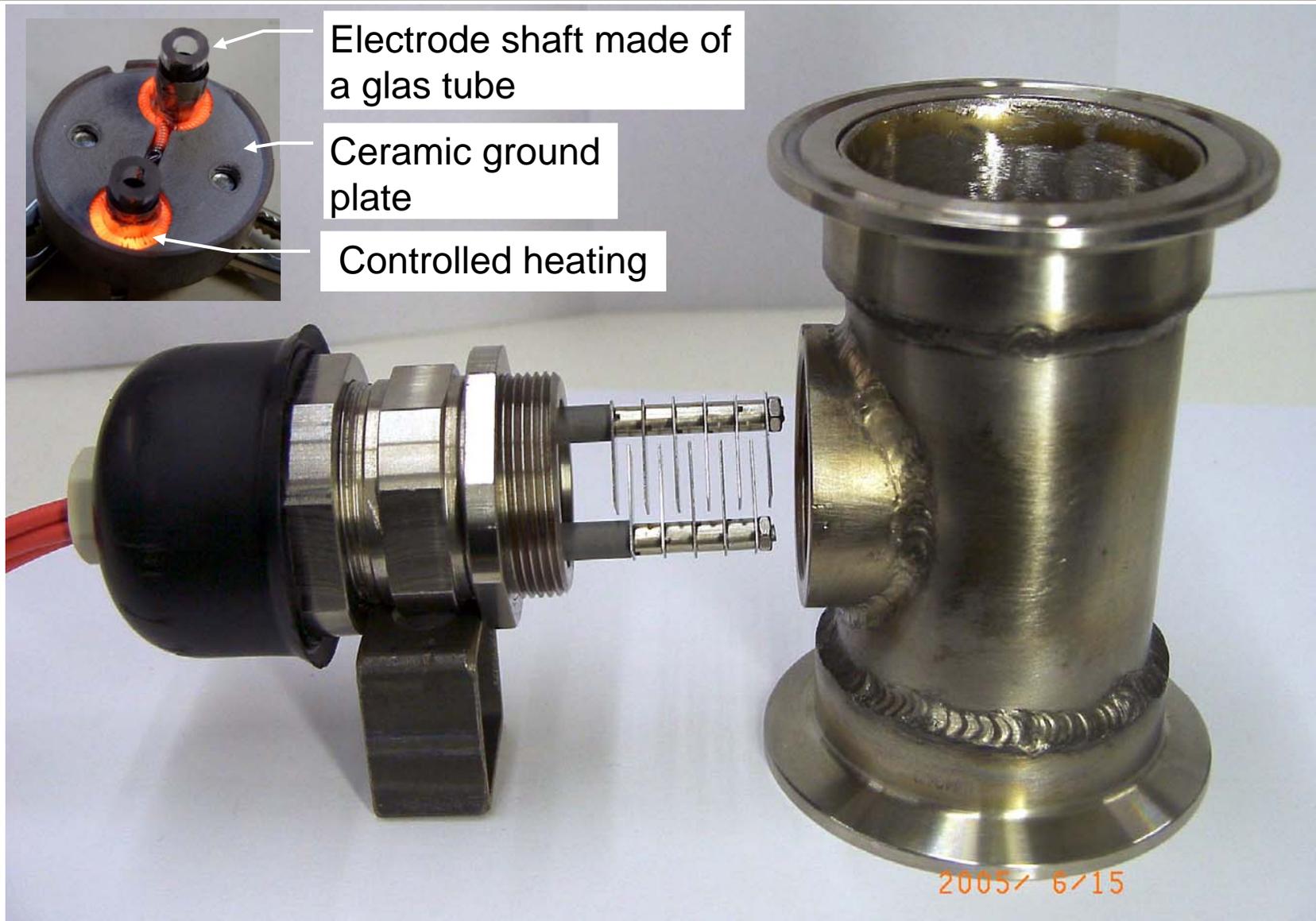
Methodology of Operation



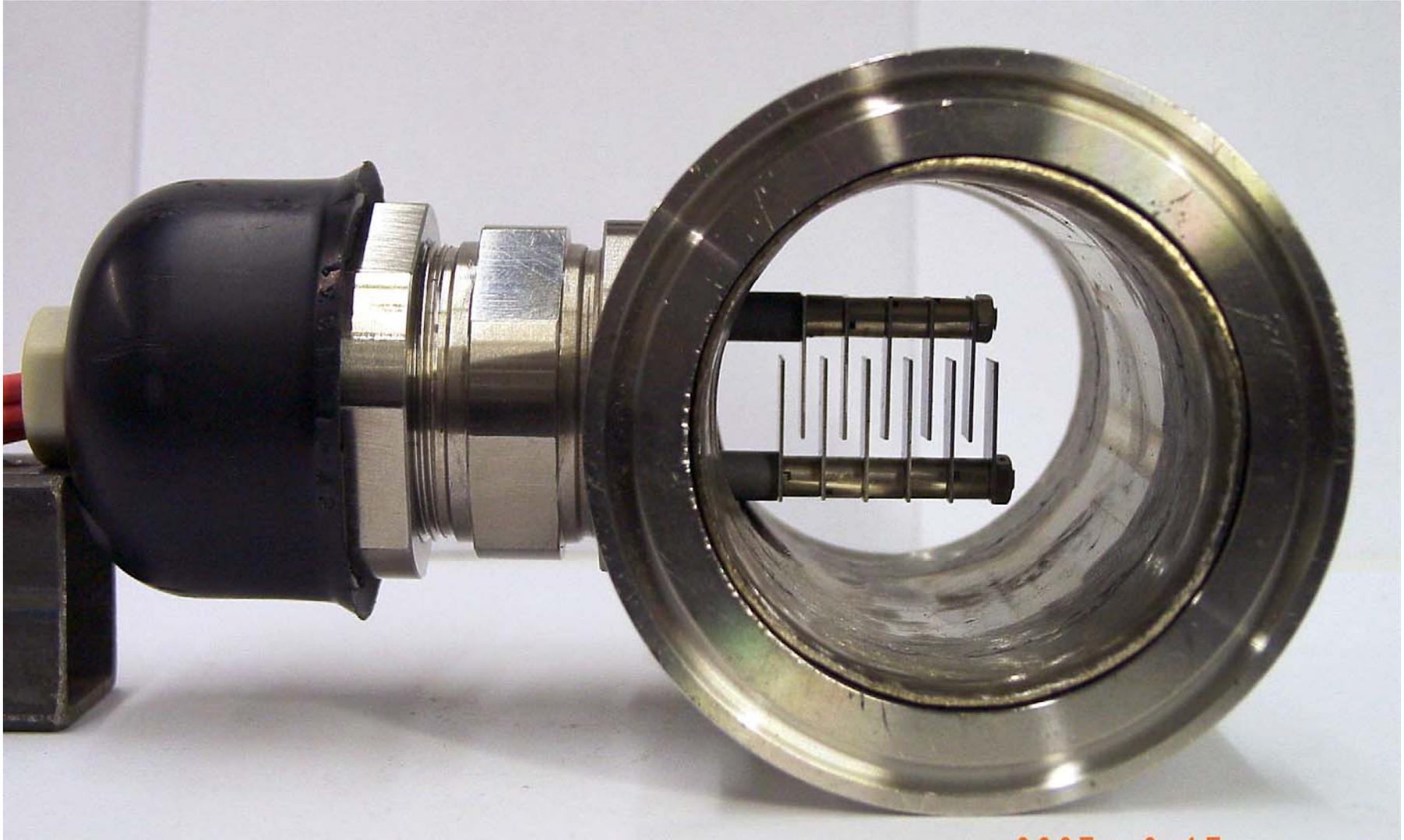
Construction principle of soot charging sensor



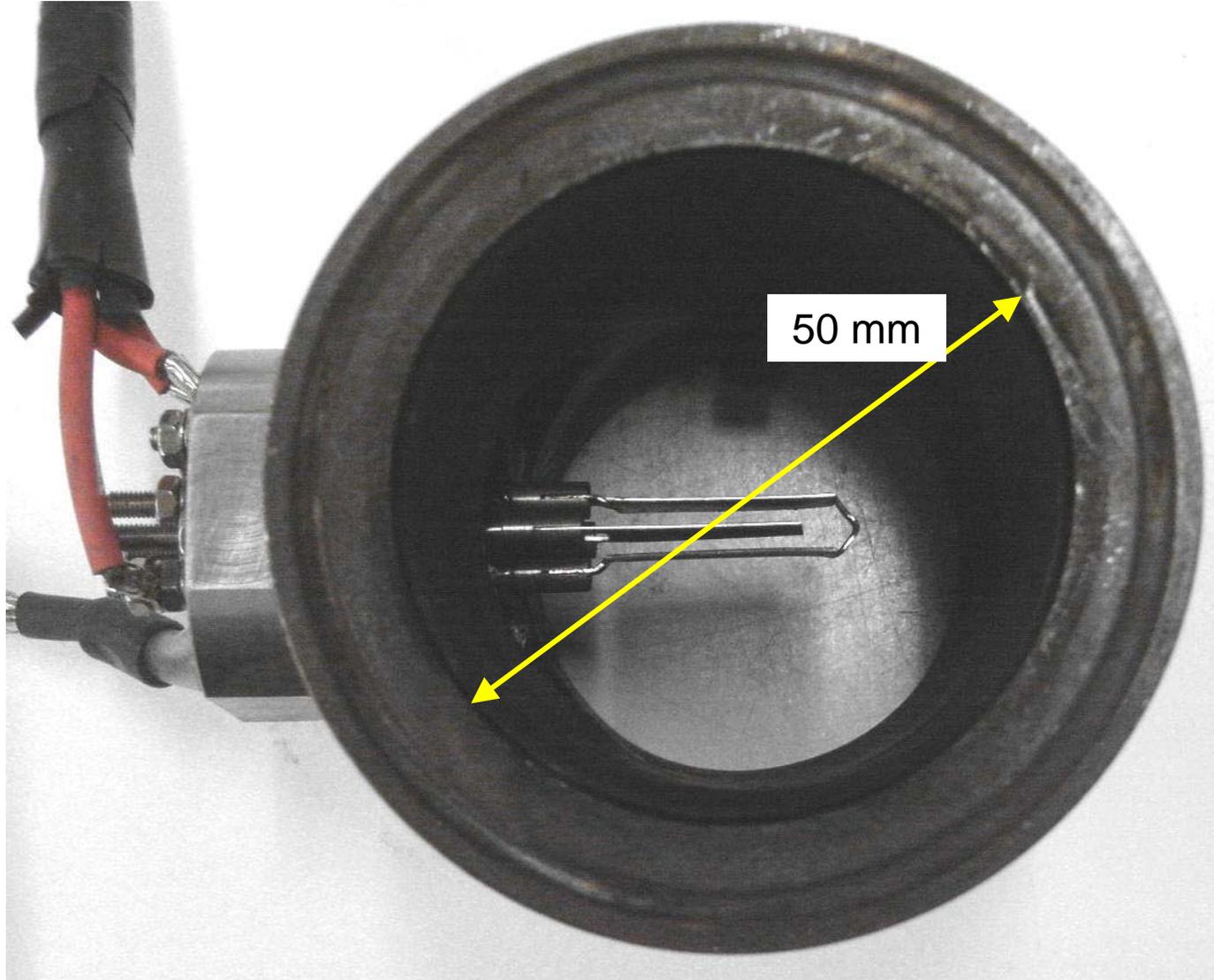
The OBD soot charging sensor



Soot charging sensor at OBD operation



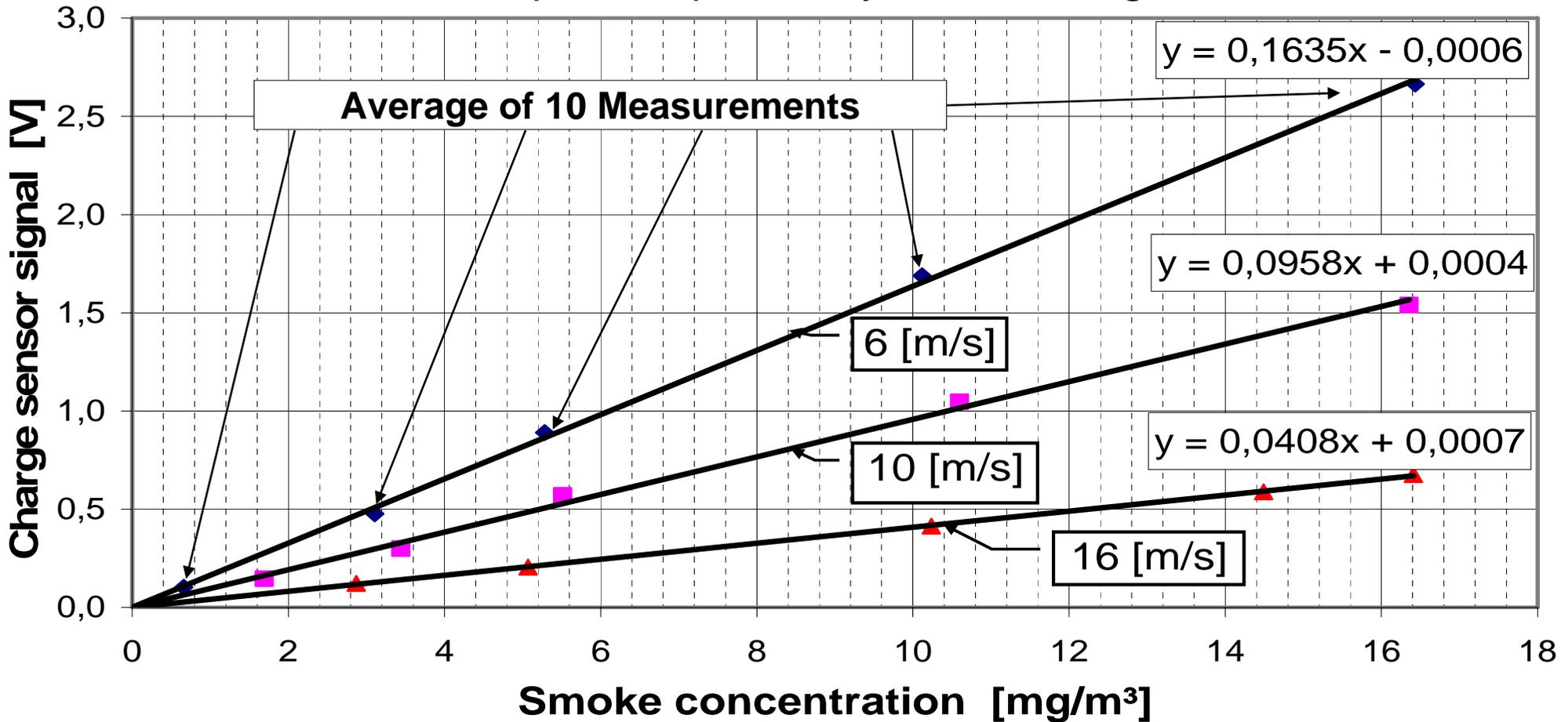
New design for heavy duty operation



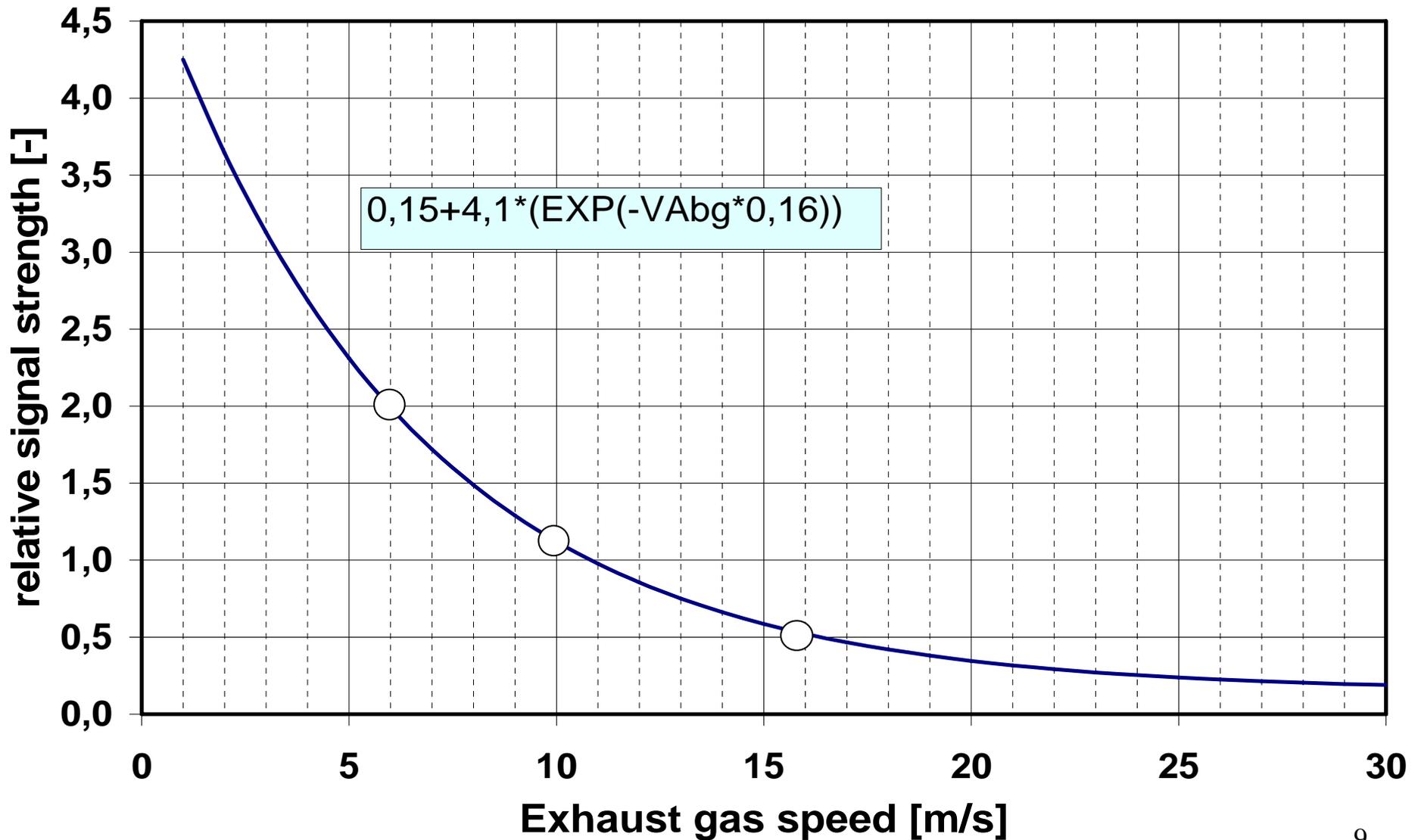
Linearity of the soot charging sensor

Full-Flow Charge- Sensor

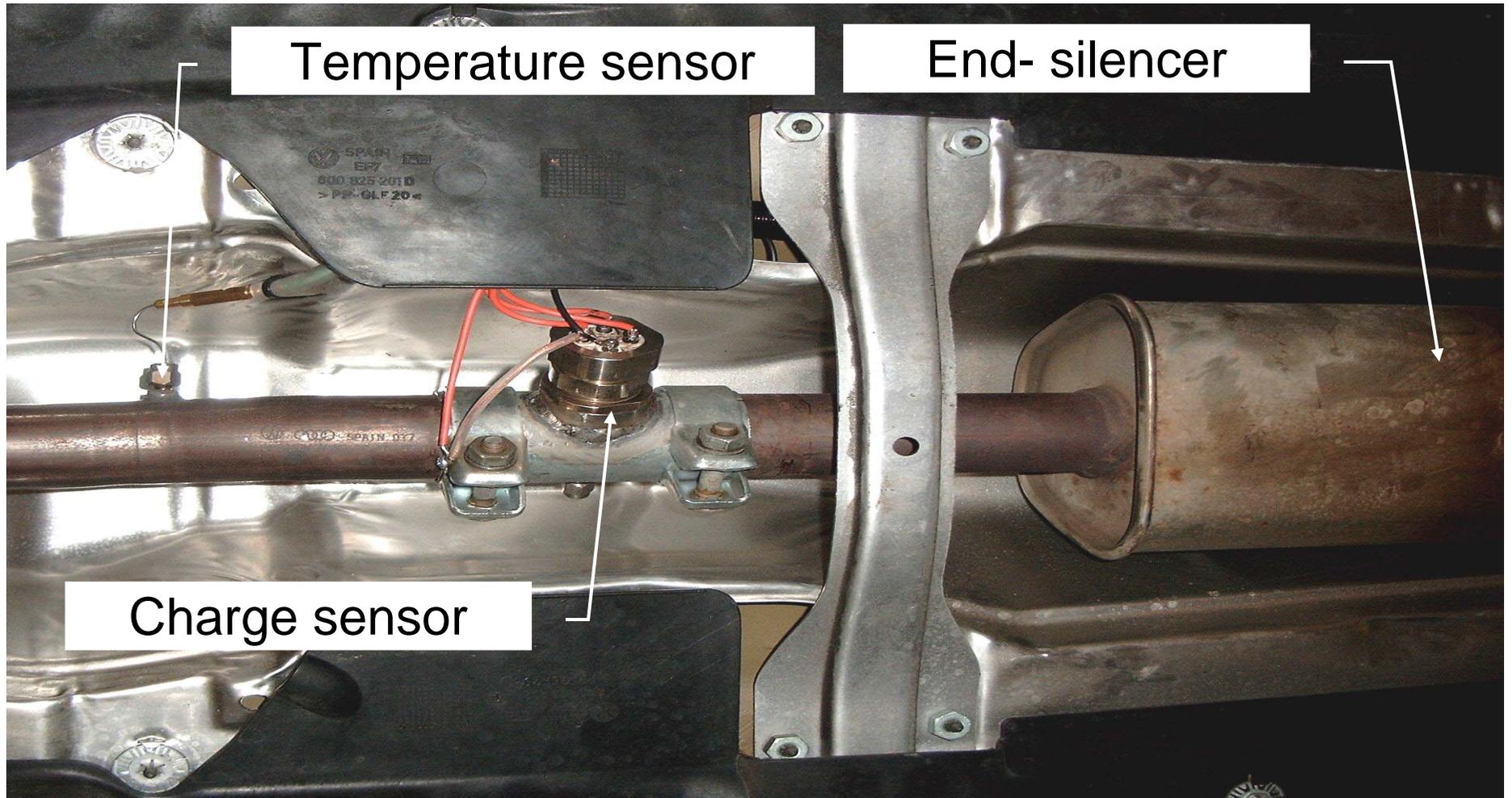
Gasflow speed dependency of sensor signal



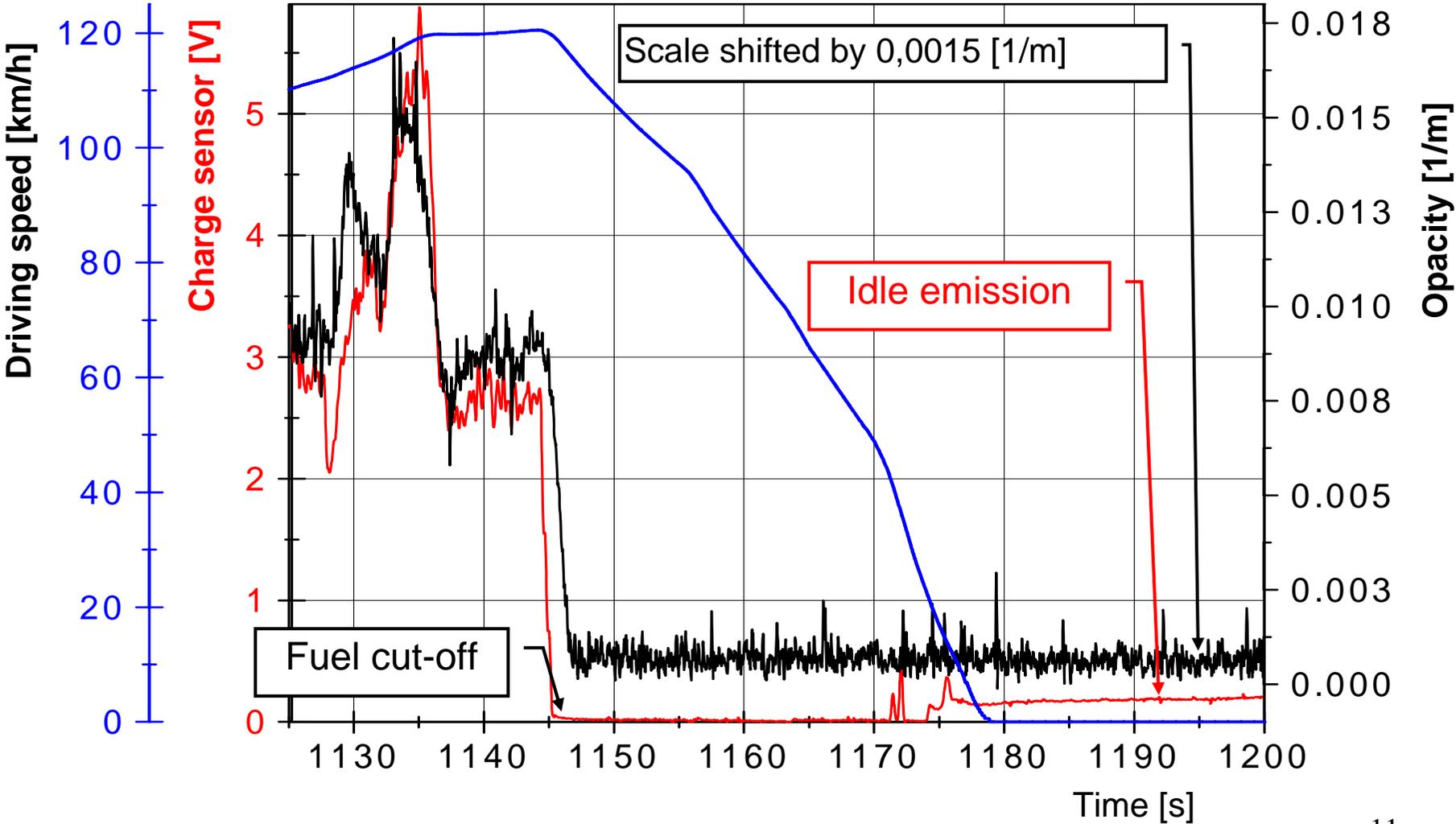
Gas speed dependency of the soot charging sensor



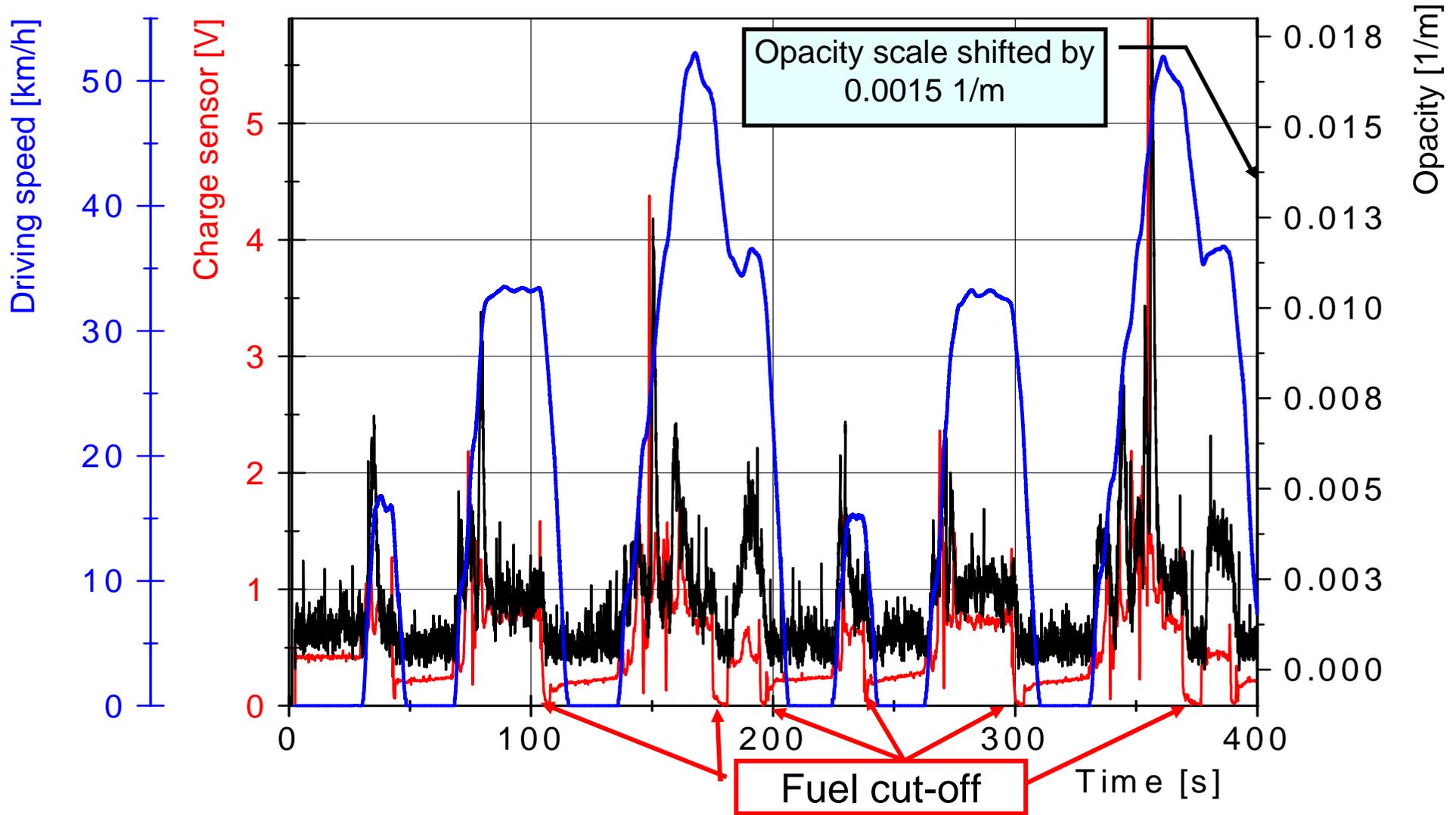
On-board measurement in a EURO IV vehicle



Last part of ECE-Cycle of an EURO IV vehicle



Begin of ECE driving cycle

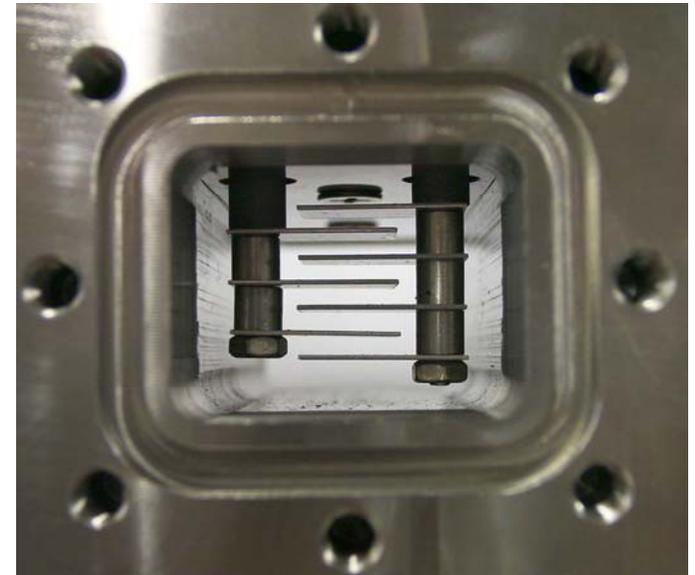
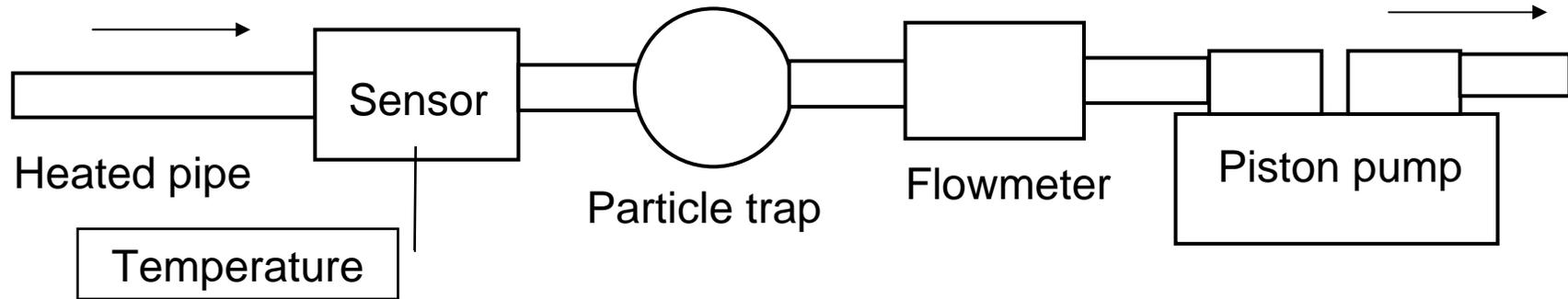


Overview

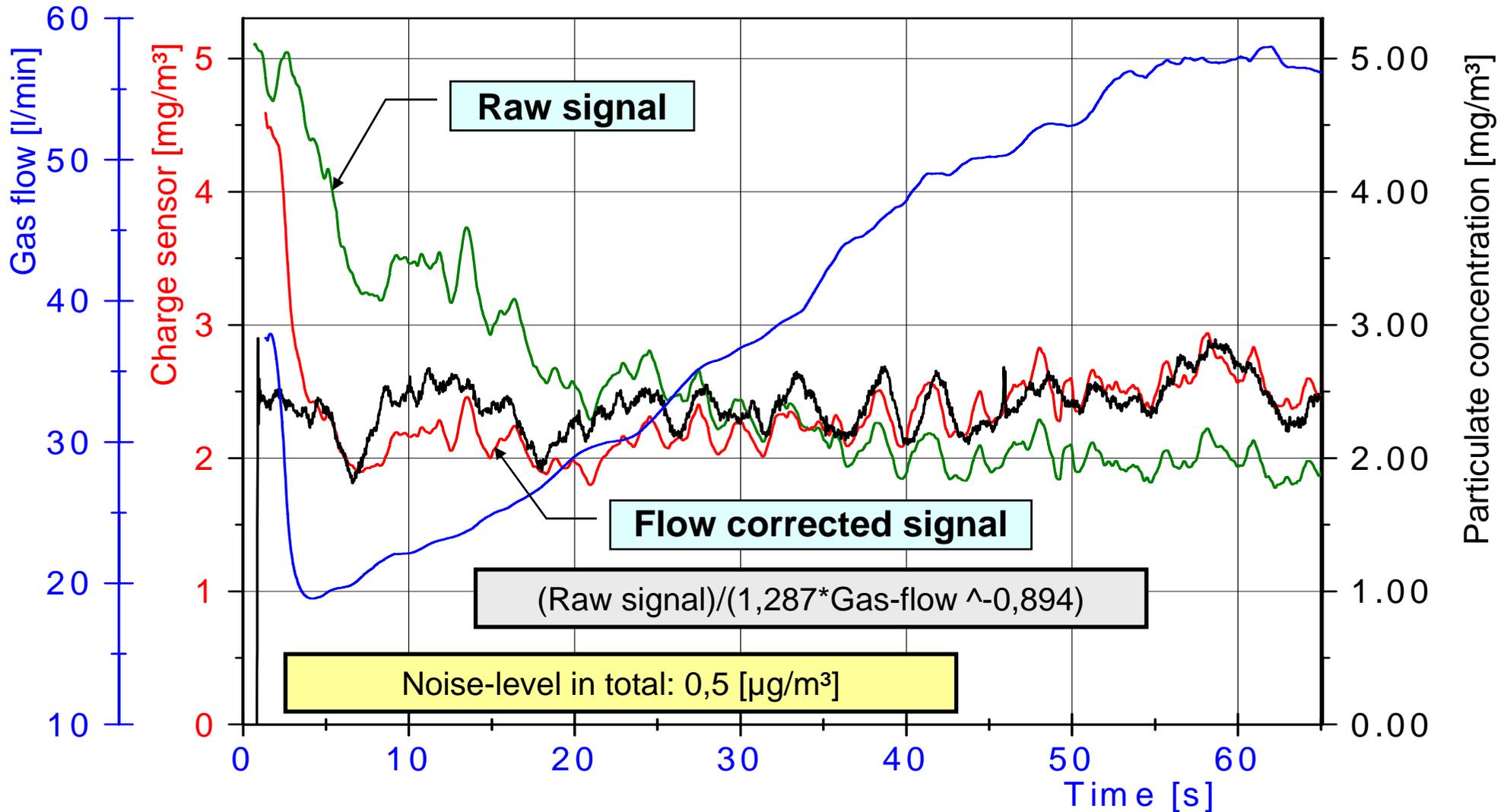


- Soot charging sensor for OBD
- Soot charging sensor as measuring instrument of high sensitivity**
- Soot impedance sensors for OBD

Soot charging sensor for high sensitive operation



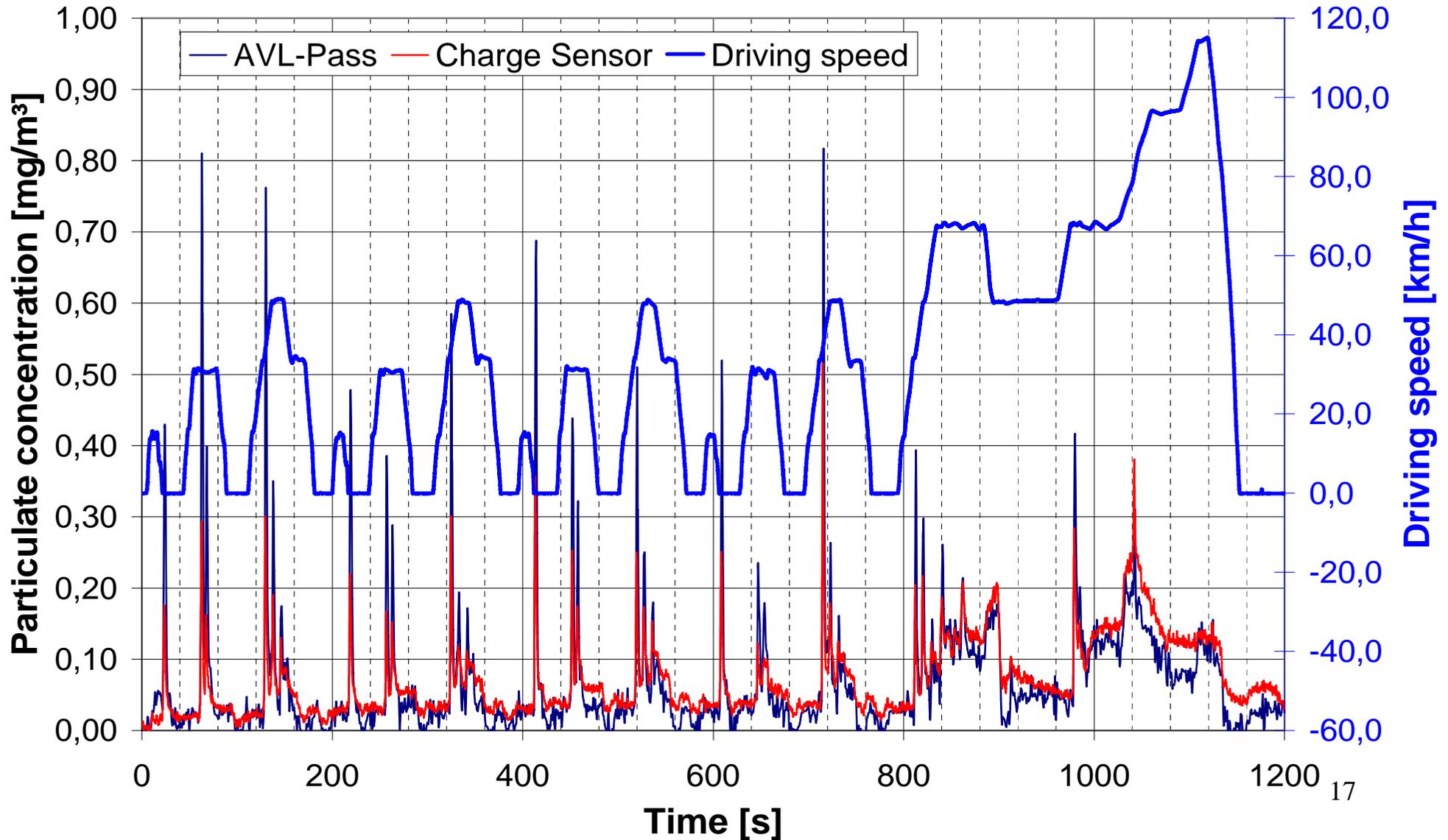
Gas flow speed correction



Measuring instrument for particle trap inspection



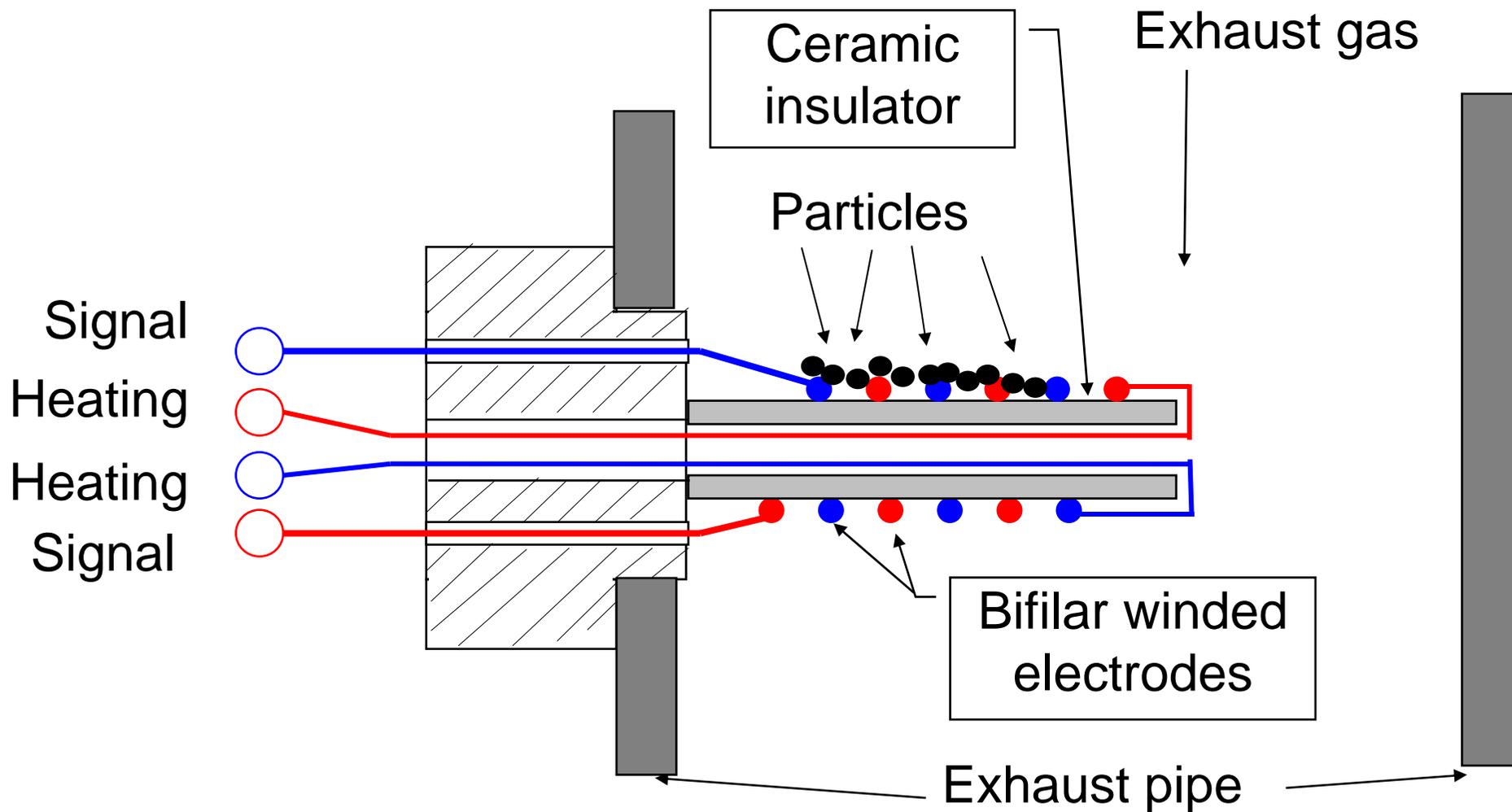
ECE Drive cycle, Euro IV vehicle with slightly damaged particle trap



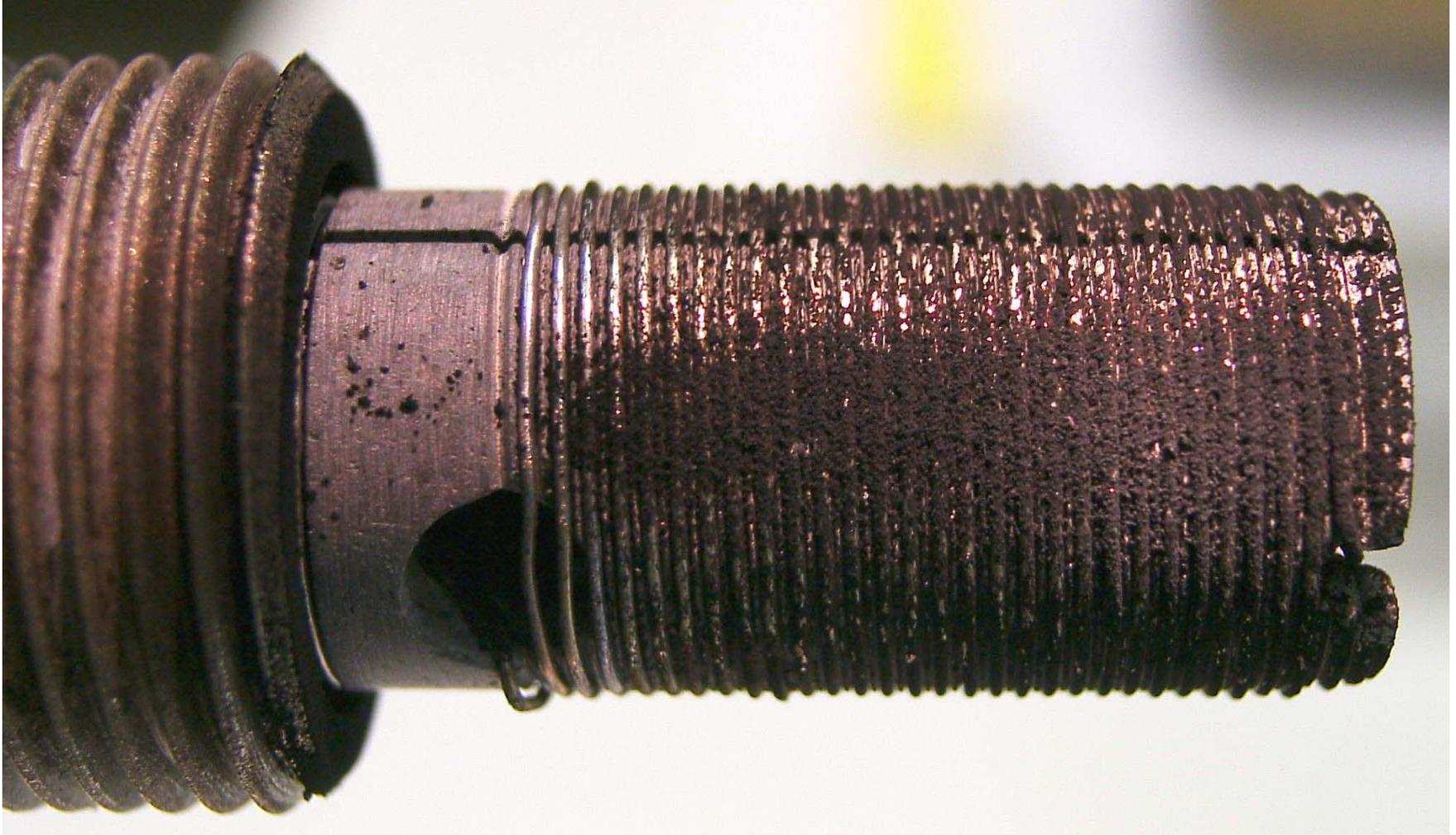
Overview

- 1.Soot charging sensor for OBD
- 2.Soot charging sensor as precision measuring instrument
- 3.Soot impedance sensors for OBD**

Principle of soot impedance sensor for OBD

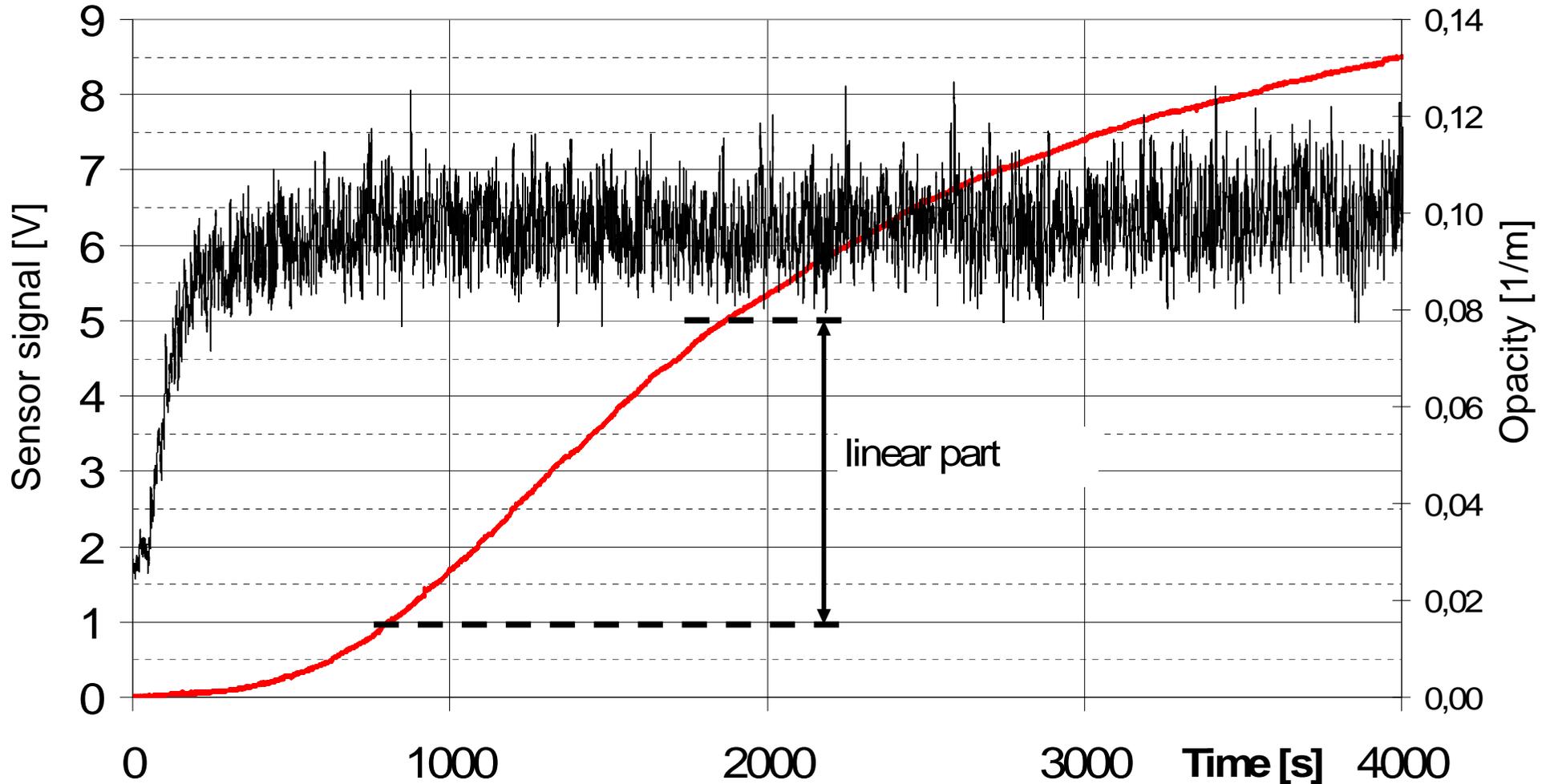


Operating behaviour of the impedance sensor



Typical resistance behaviour

Long-time test bench operation

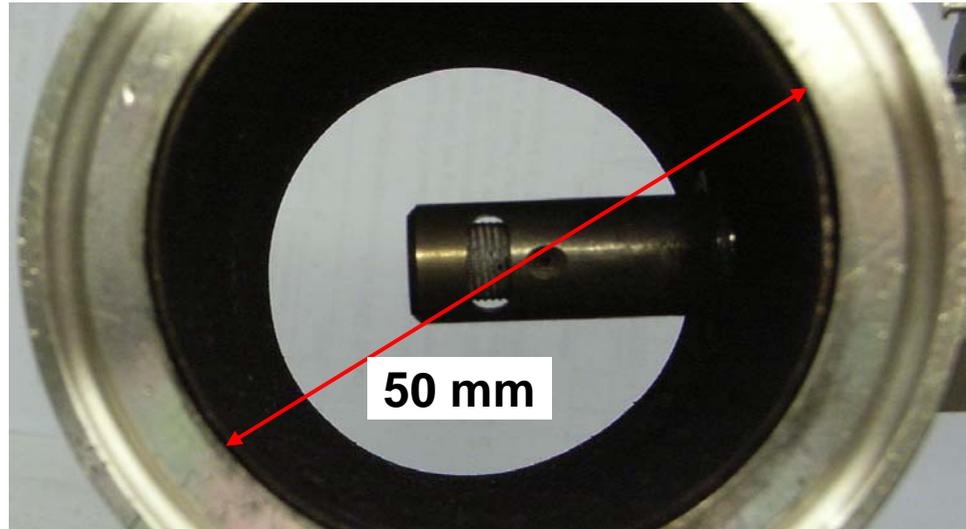


Application of the bifilar sensor

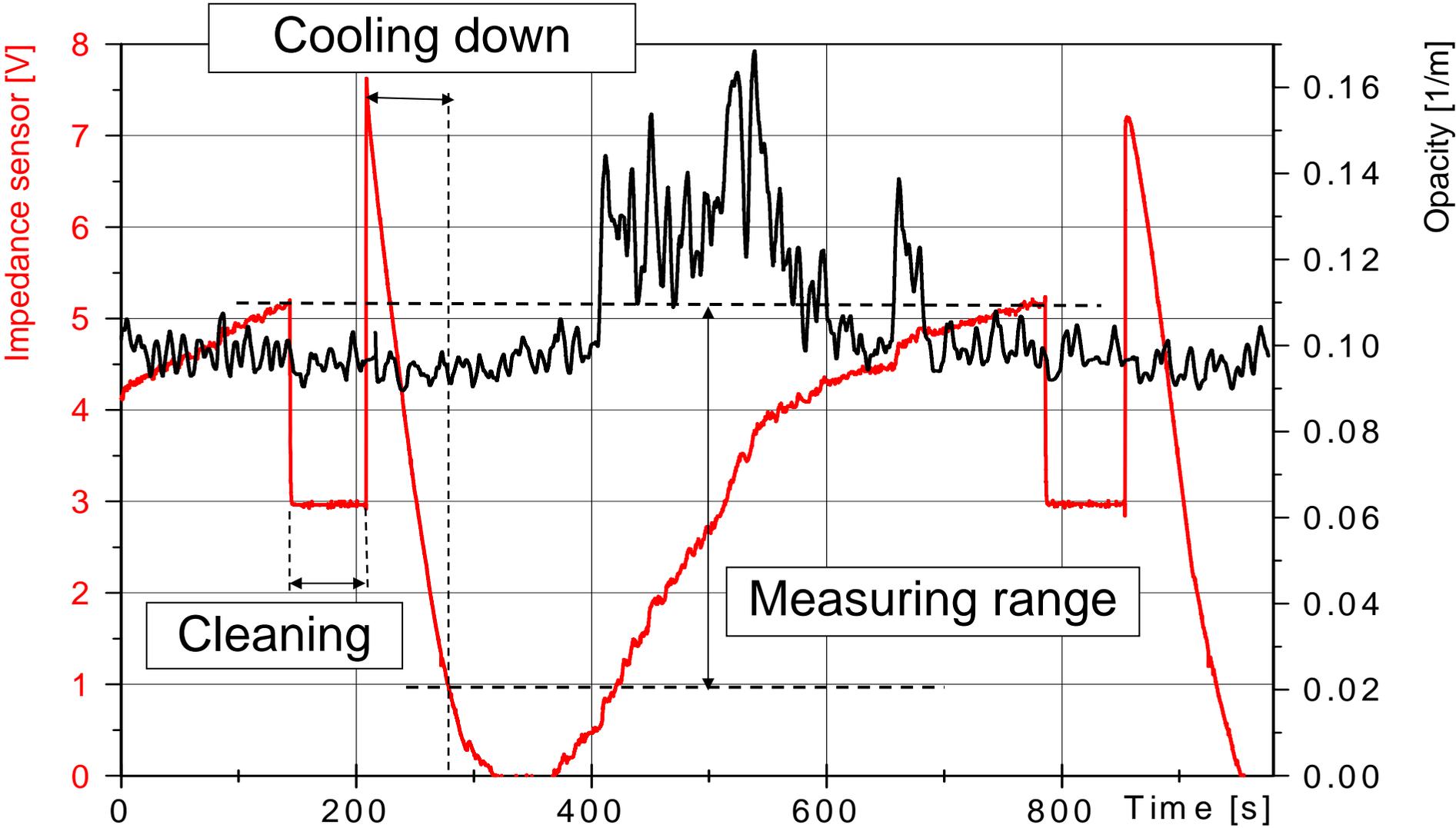
Nickel wire 0.4 mm



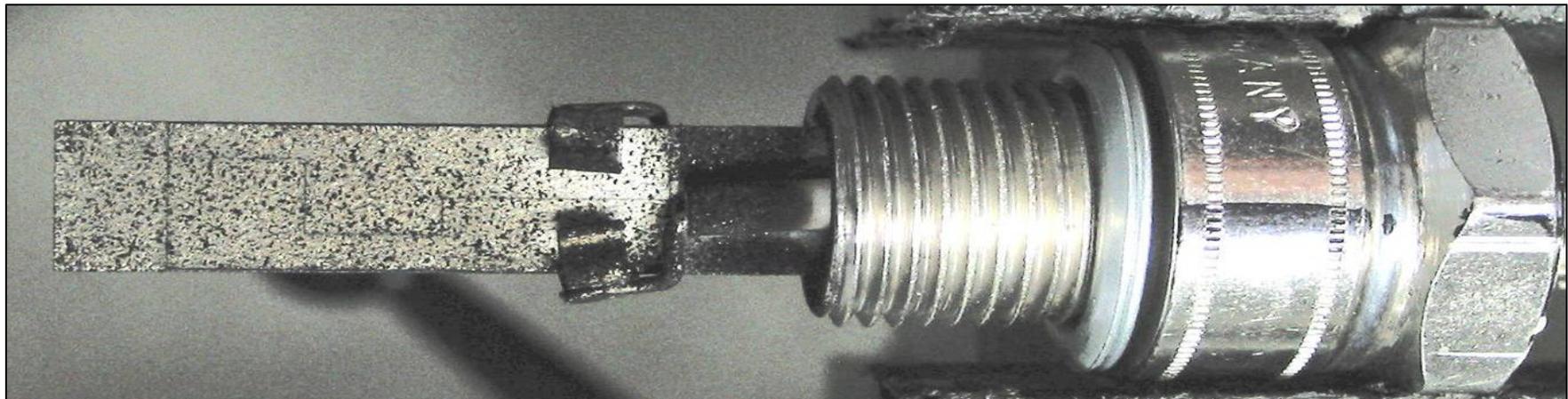
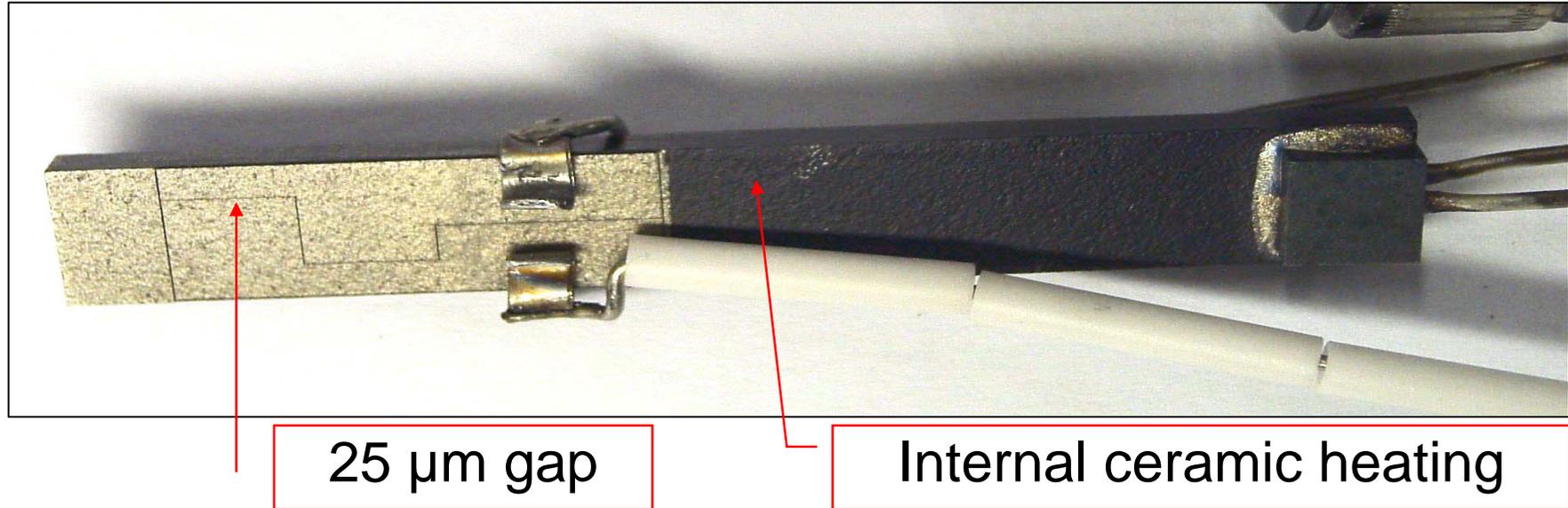
Cleaned sensor after 2 days operation



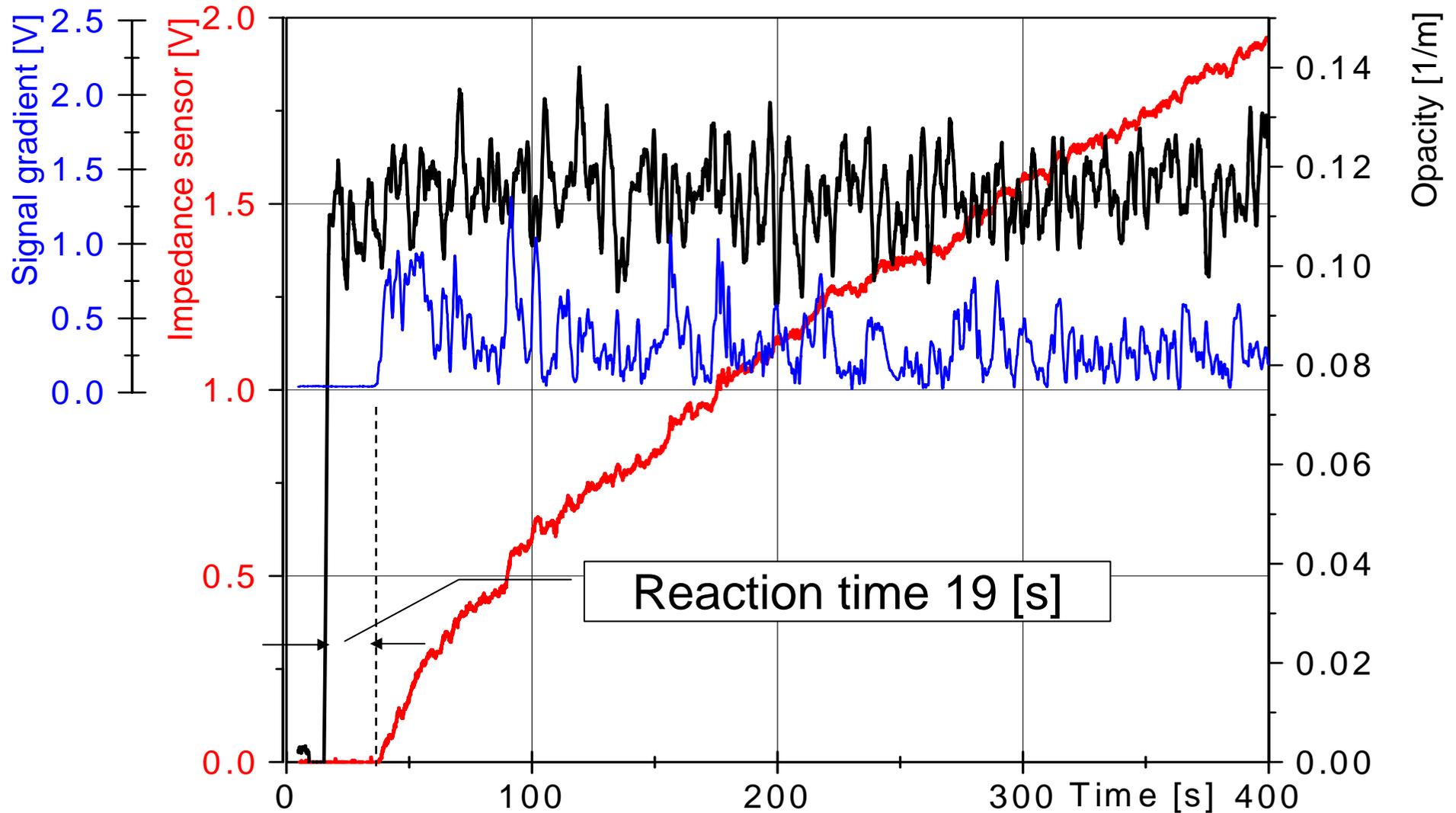
The bifilar sensor in operation



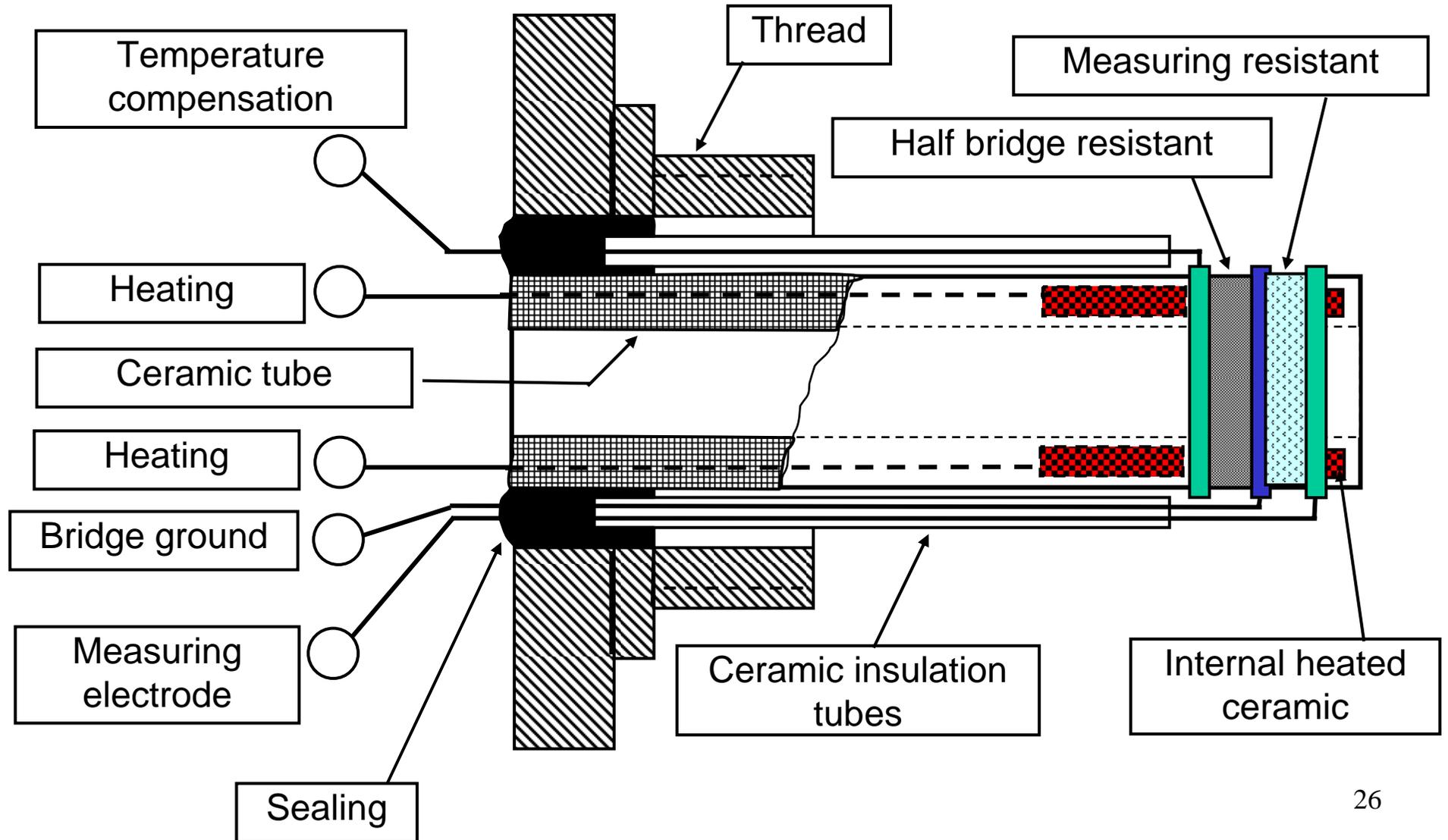
The chrome sputtered impedance sensor



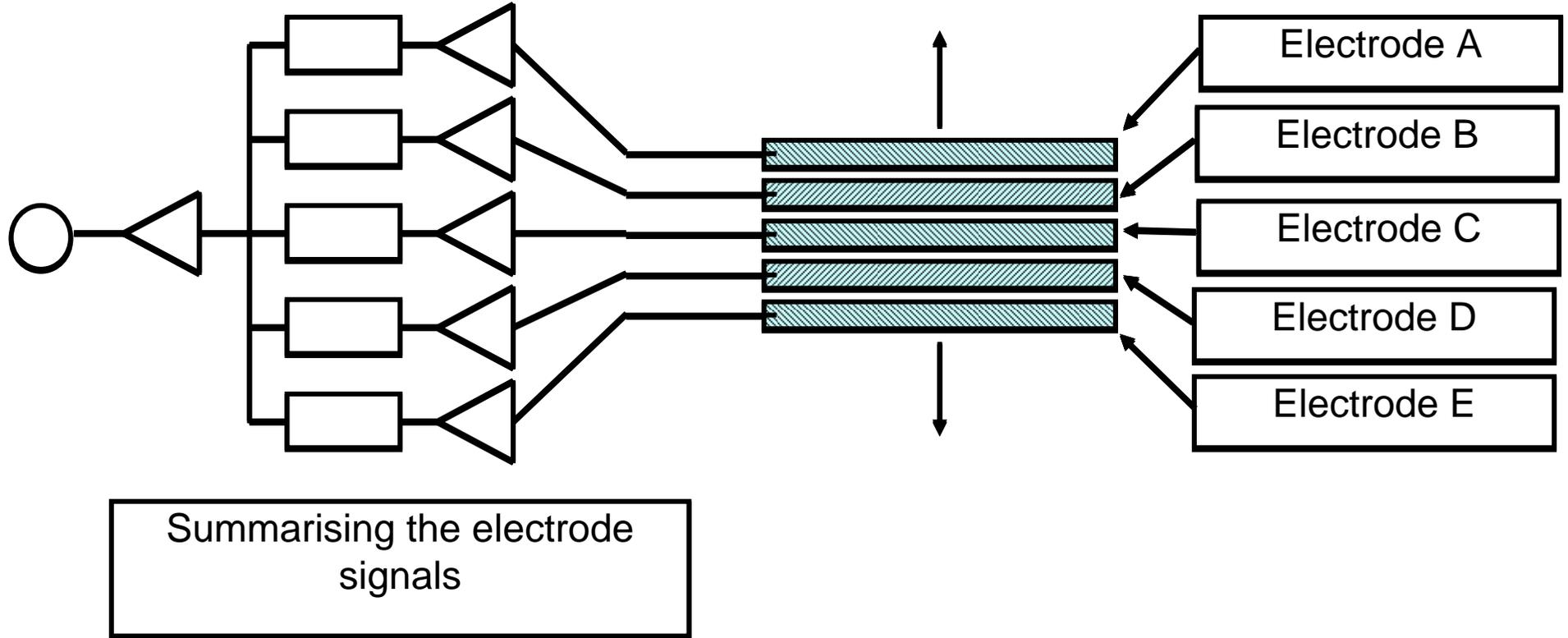
Time behaviour of the chrome sputtered sensor



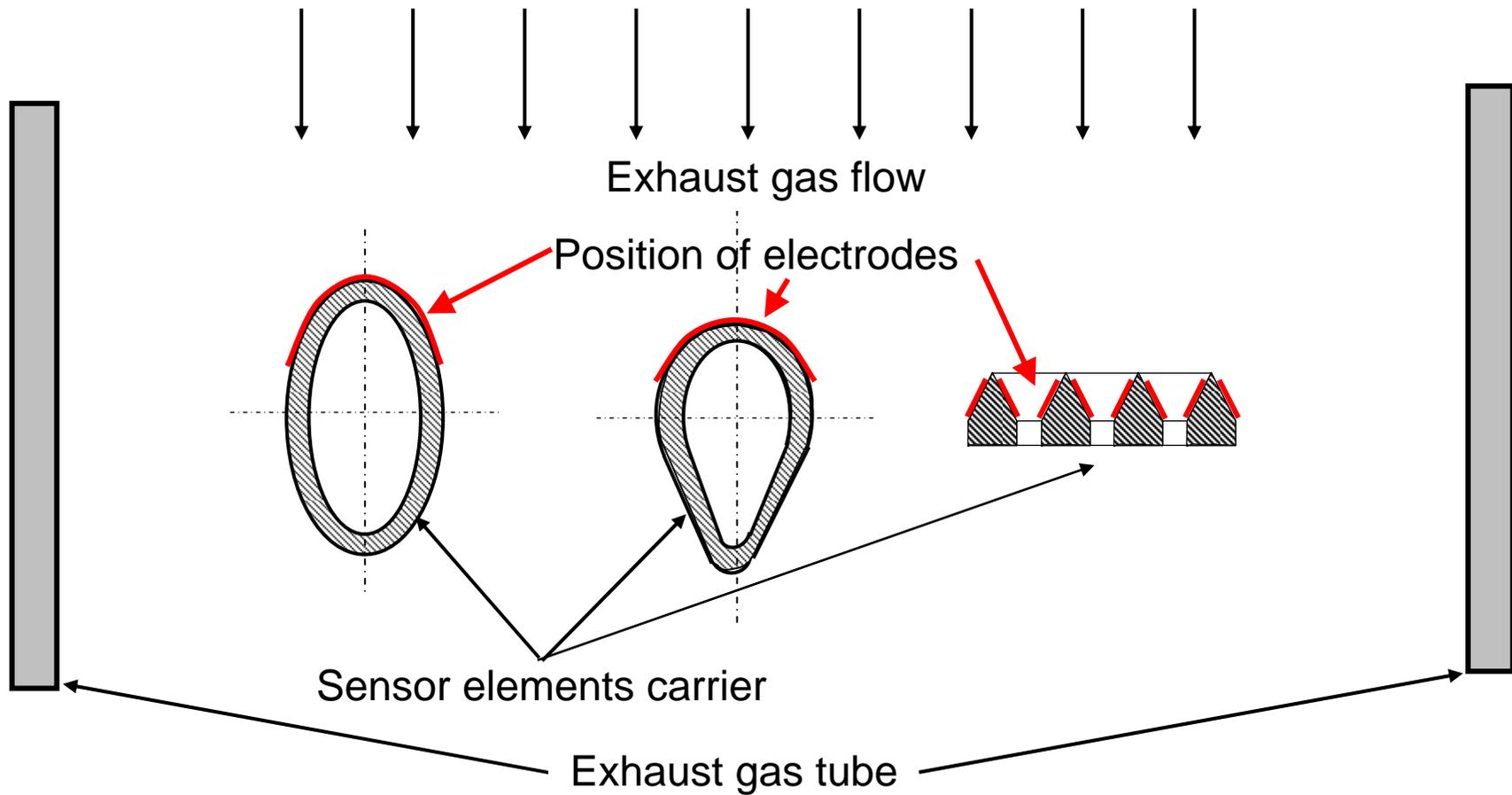
Wheatstone bridge impedance sensor



Electrode- array for higher efficiency



Optimisation for particle deposit



Conclusion

- Both types of soot sensors are capable for OBD applications but with different demands on the sensitivity.
- The soot charging sensor measures continuously at high sensitivity whilst the soot impedance sensor supplies the measuring result stepwise.
- At bypass operation the soot charging sensor can be used as separate measuring instrument for garages and the periodical inspection of particle traps.