

# Particle Emissions from wood combustion

(Concentration in Raw and Diluted Flue Gas)

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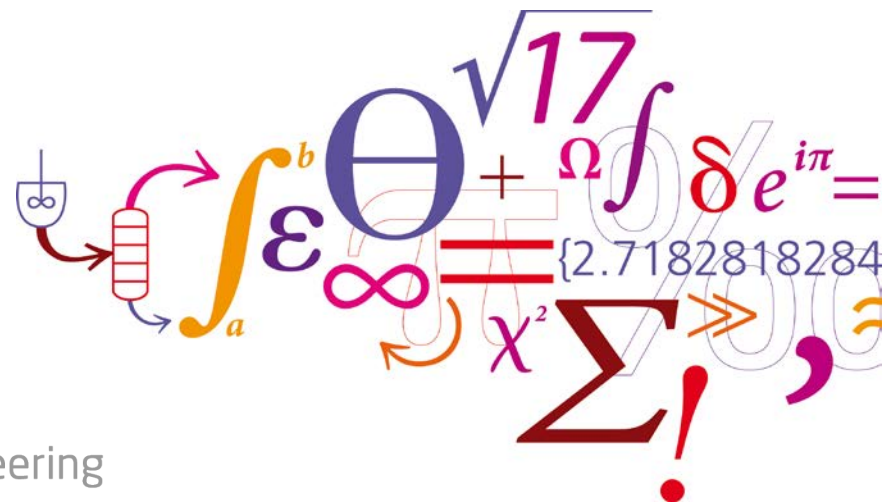
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# Contents

- Introduction
- Test set-up
- Particle concentration
- Standards
- Techniques and instruments

# Wood combustion

- Small-scale residential wood stoves!





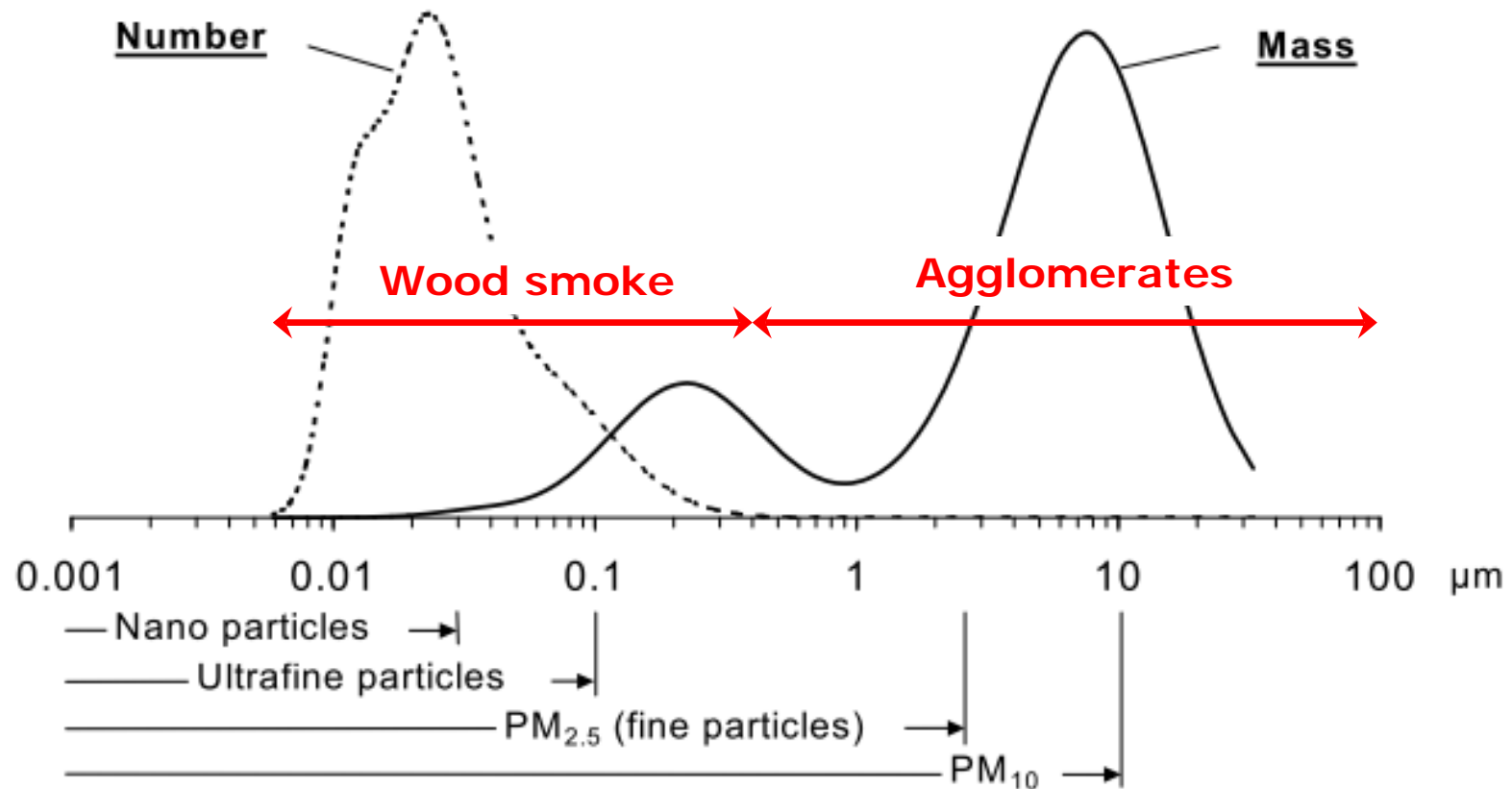
# Introduction

- Residential wood stove (HWAM 3400)
- Chimney, dilution tunnel,... (NS 3058-1)
- Particle emissions
  - NS 3058-2
  - SMPS
  - ELPI
  - HT-ELPI





# Particle emissions

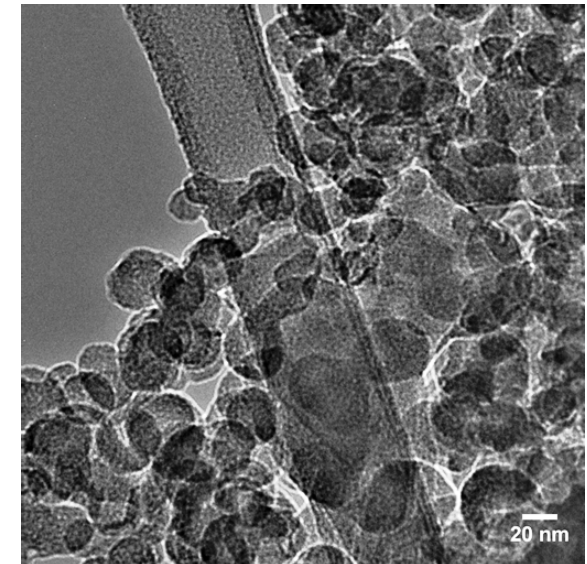
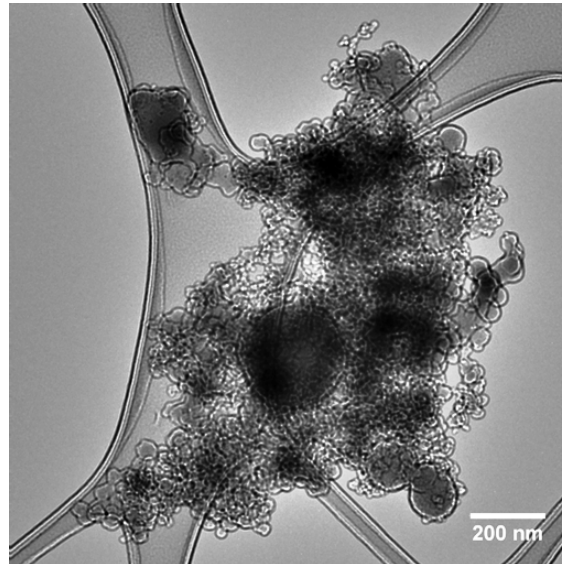
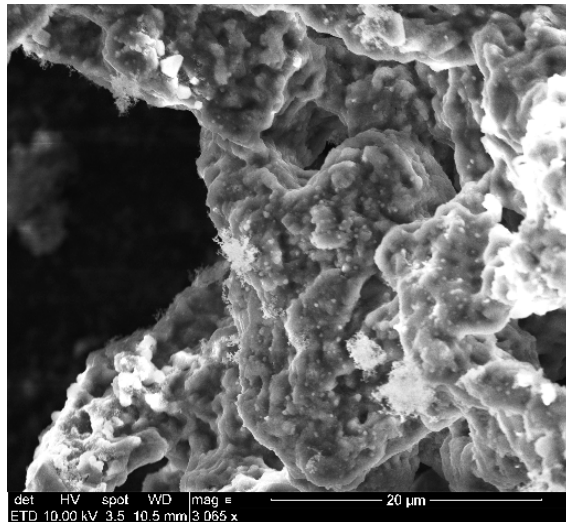


Ref: Lars Gunnarsen, Statens Byggeforskningsinstitut, Aalborg University



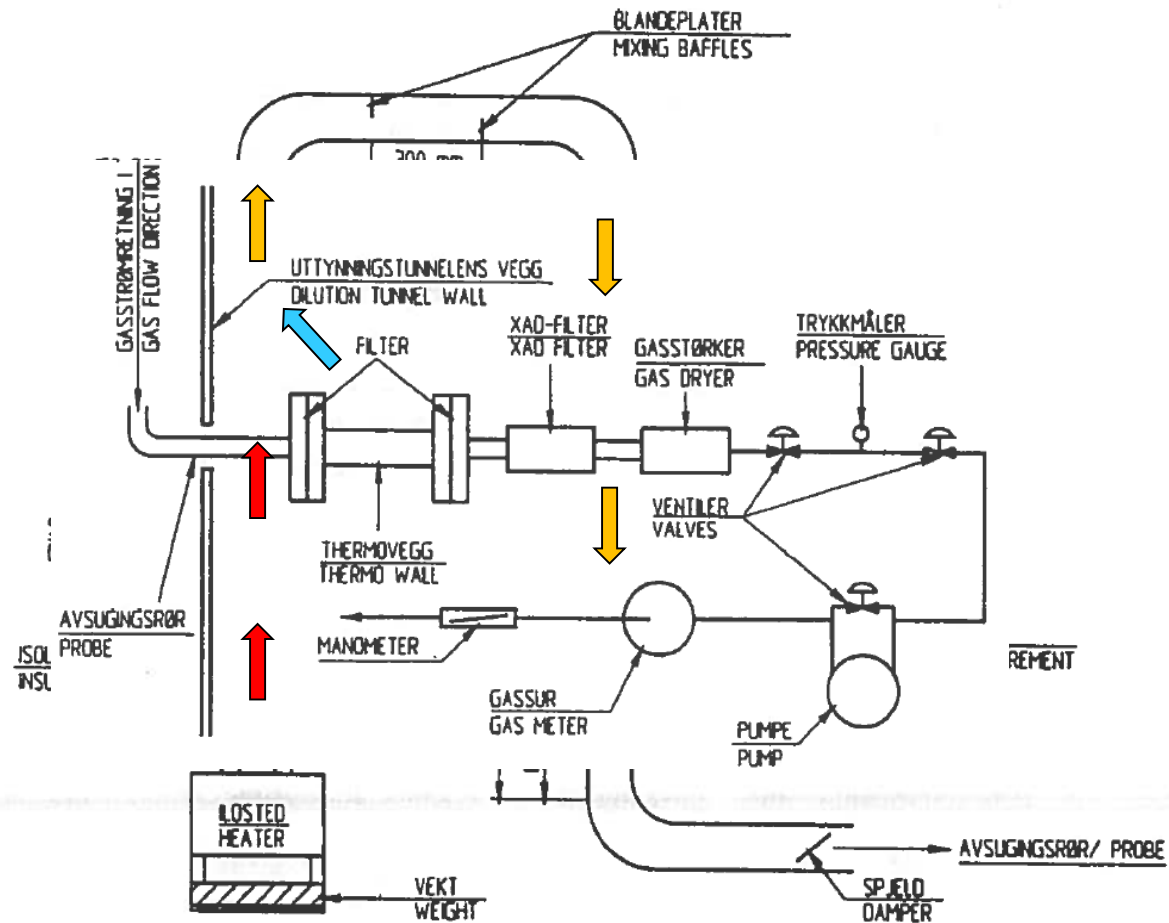
# SEM - TEM

- Scanning Electron Microscopy
- Transmission Electron Microscopy



# NS 3058-2:1994

- Particle mass emission





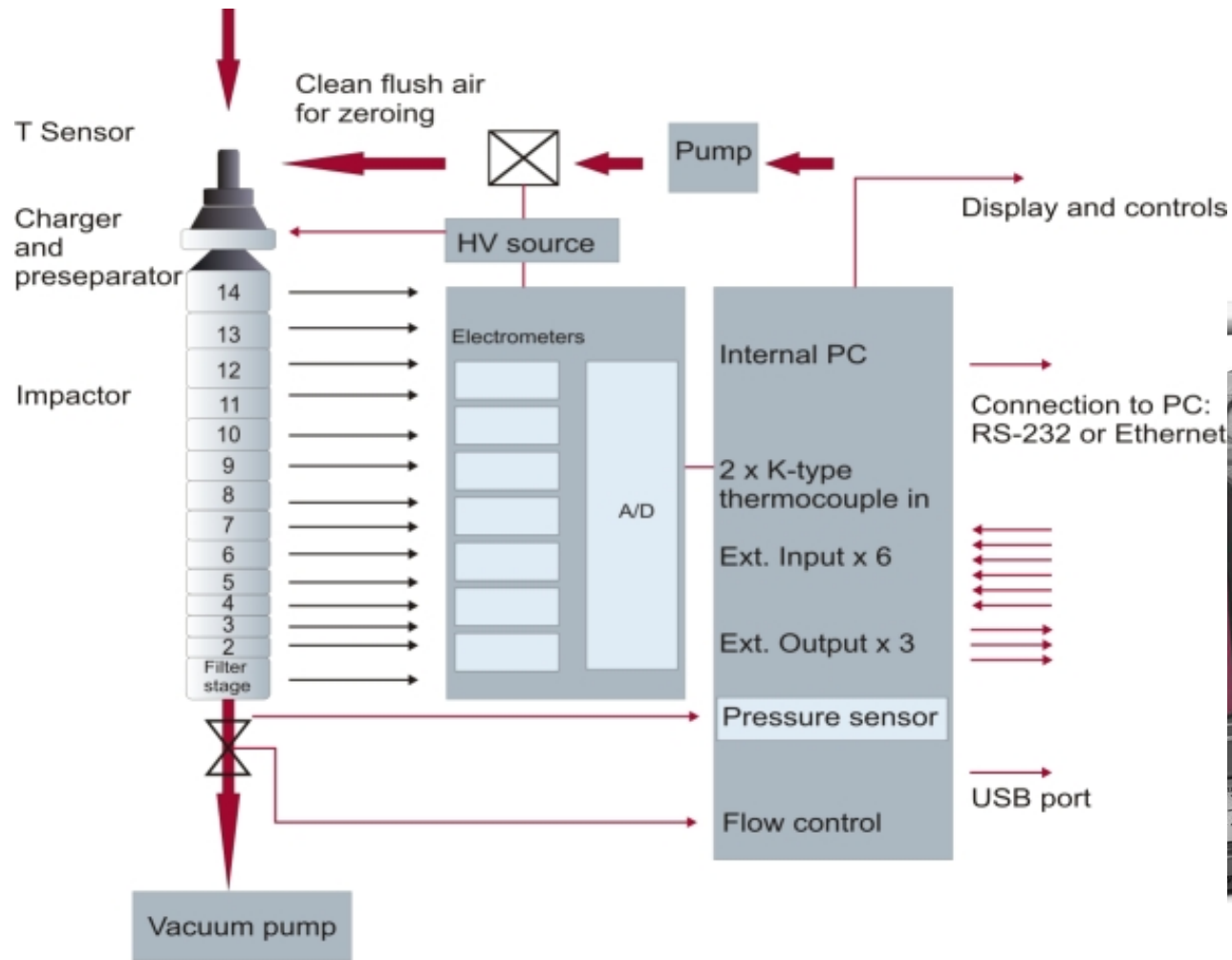
# SMPS

- Scanning mobility particle sizer
- Electrostatic classifier (DMA 3080)
- CPC 3775
  - Down to 4 nm
  - Up to  $10^7$  #/cm<sup>3</sup>





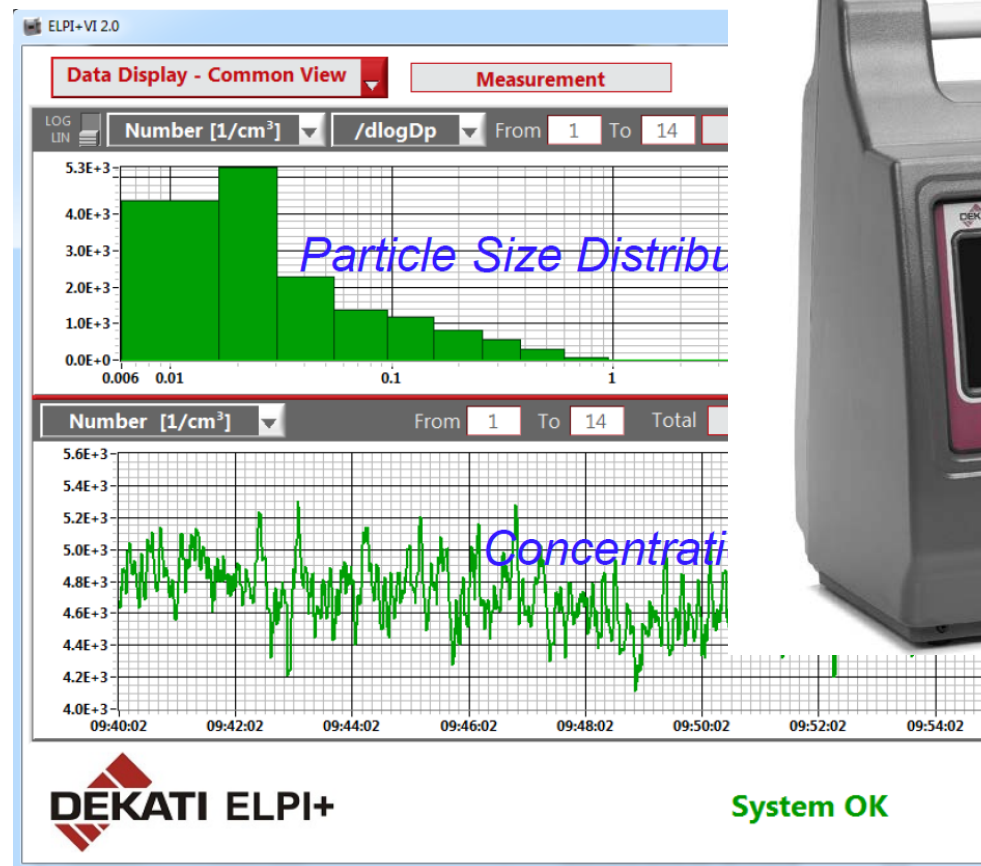
# ELPI +



[www.dekati.com](http://www.dekati.com)

# ELPI +

- 6 nm to 10  $\mu\text{m}$
- Measurement options:



# HT ELPI +

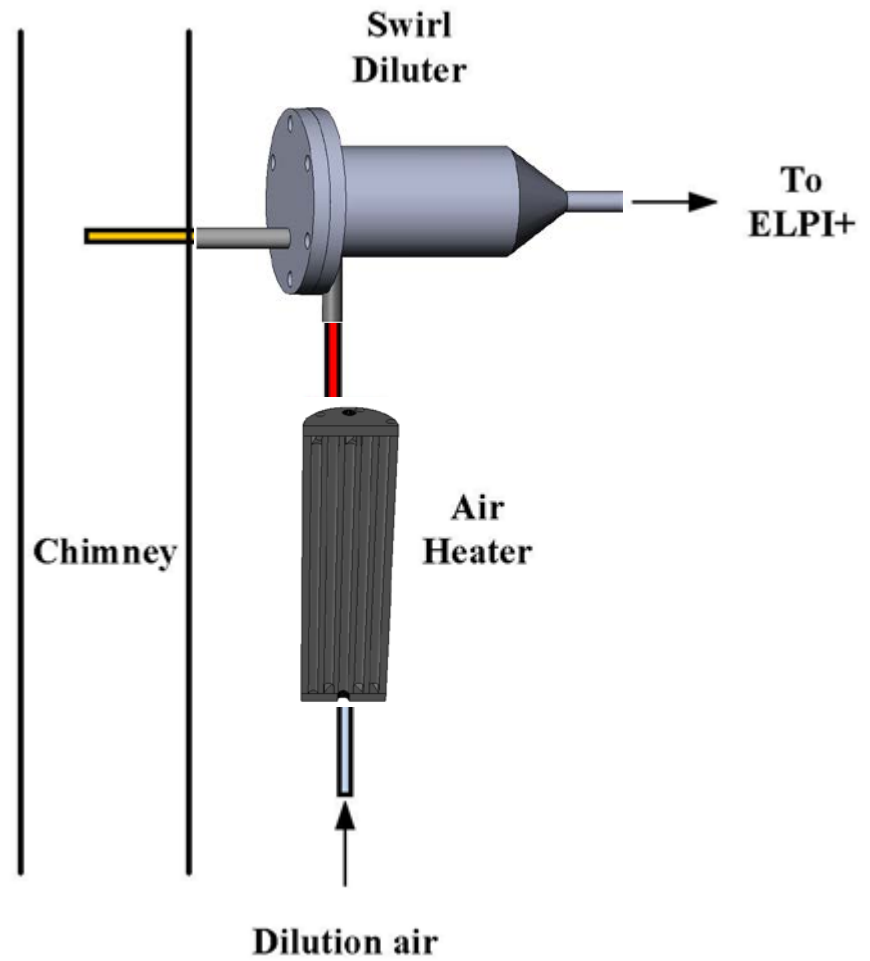
- High temperature ELPI
- Direct sampling of raw flue gas
- (60-120-180) °C





# HT ELPI +

- High temperature diluter
- Air heater up to 200 °C



# Thanks for your attention!

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