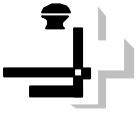


L. Jing
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**Properties of soot particles produced
by a combustion aerosol standard**



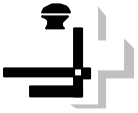
Properties of soot particles produced by a combustion aerosol standard (CAST)

4. International Conference on Nanoparticle-Measurement,
ETH Hönggerberg Zürich

August 7.- 8. 2000

Dr. Lianpeng Jing

Swiss Federal Office of Metrology



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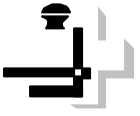
1. Introduction

2. Features of the Combustion Aerosol Standard (CAST) and Characteristics of the Soot Particles

3. Parameters of the CAST and Their Influences

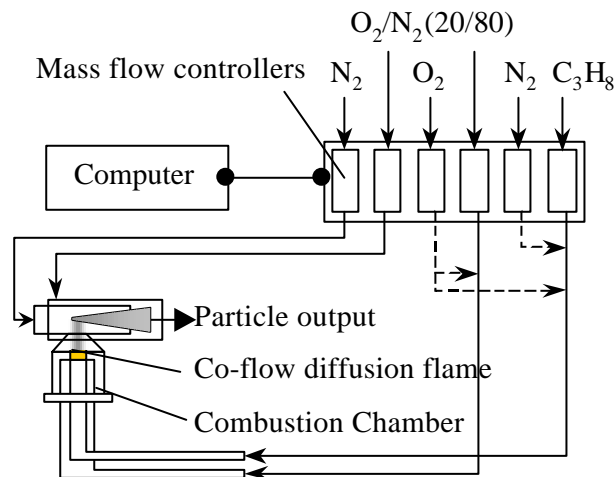
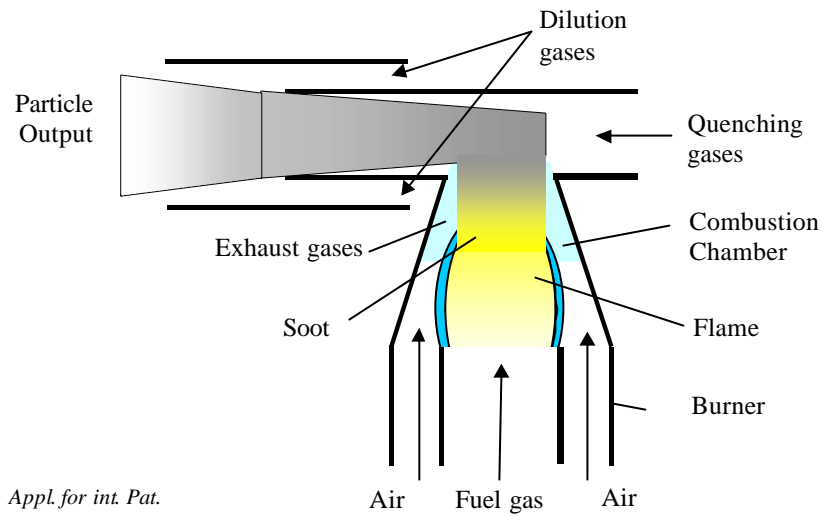
4. Conclusions

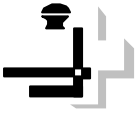
5. References



1. Introduction

Operational principle of the Combustion Aerosol Standard (CAST)





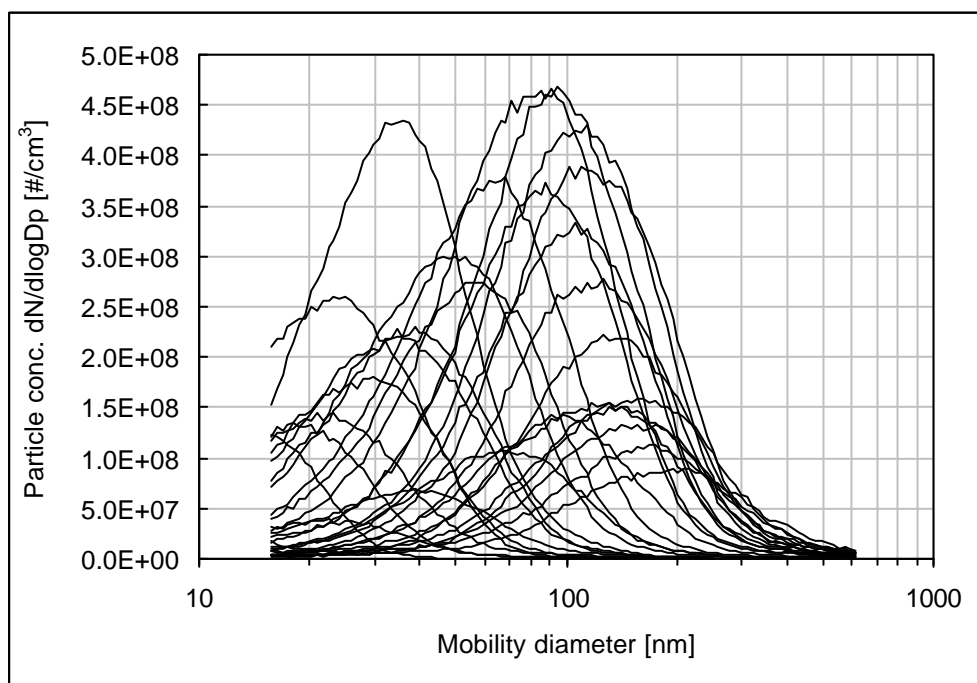
2. Features of the CAST and Characteristics of the Soot Particles

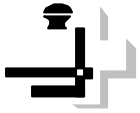
2.1. Particle analysis and methods

- Particle size (SMPS)
- Particle concentration (SMPS)
- Particle matter (Gravimetric analysis)
- Elementary Carbon (Coulometric analysis)
- Morphology (TEM)

2.2. Features of the CAST

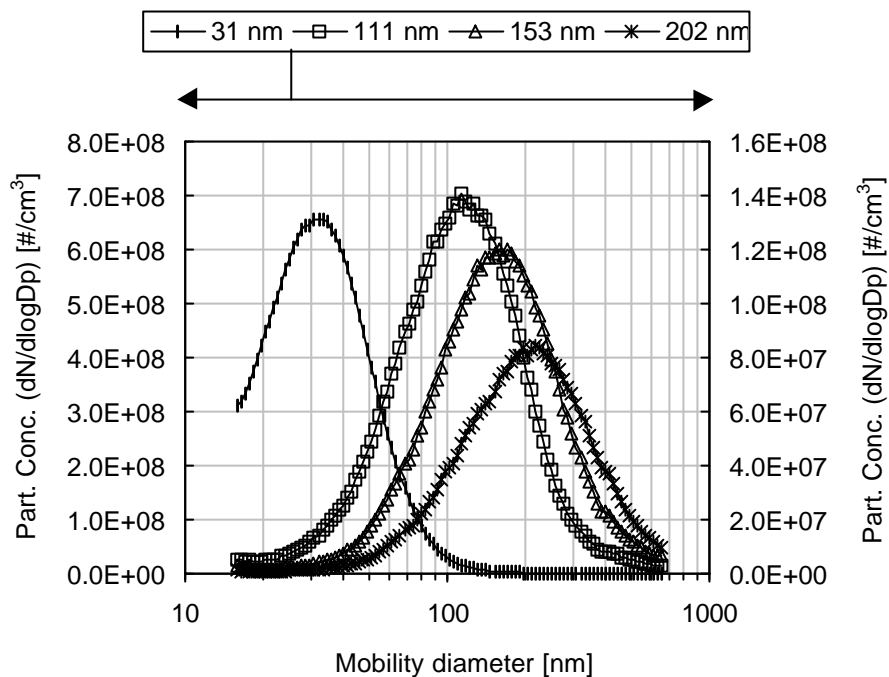
- Real combustion particles
- Adjustable mobility diameter range from 20 - 200 nm
- High concentration
- High stability and reproducibility in size and concentration



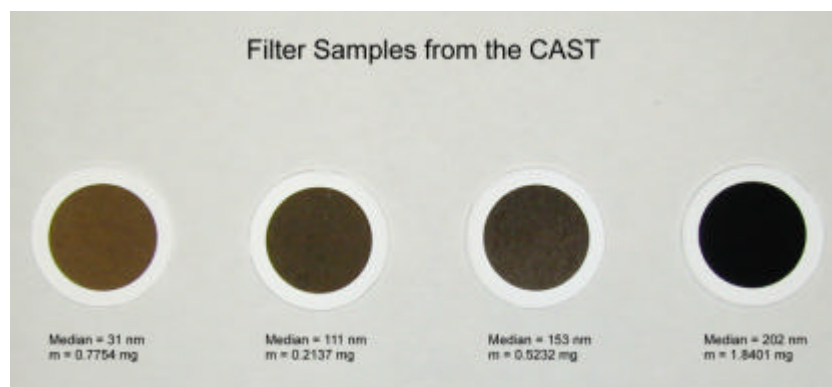


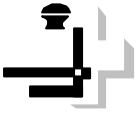
2. Features of the CAST and Characteristics of the Soot Particles

2.3. Soot Particles from the CAST (Examples)



Geo. Mean	Part. conc.	PM	EC
nm	#/m ³	mg/m ³	%
31	3.01E+14	8	75%
111	8.19E+13	8	97%
153	7.12E+13	28	99%
202	5.39E+13	47	99%

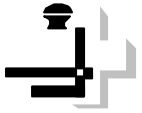




3. Parameters of the CAST and Their Influences

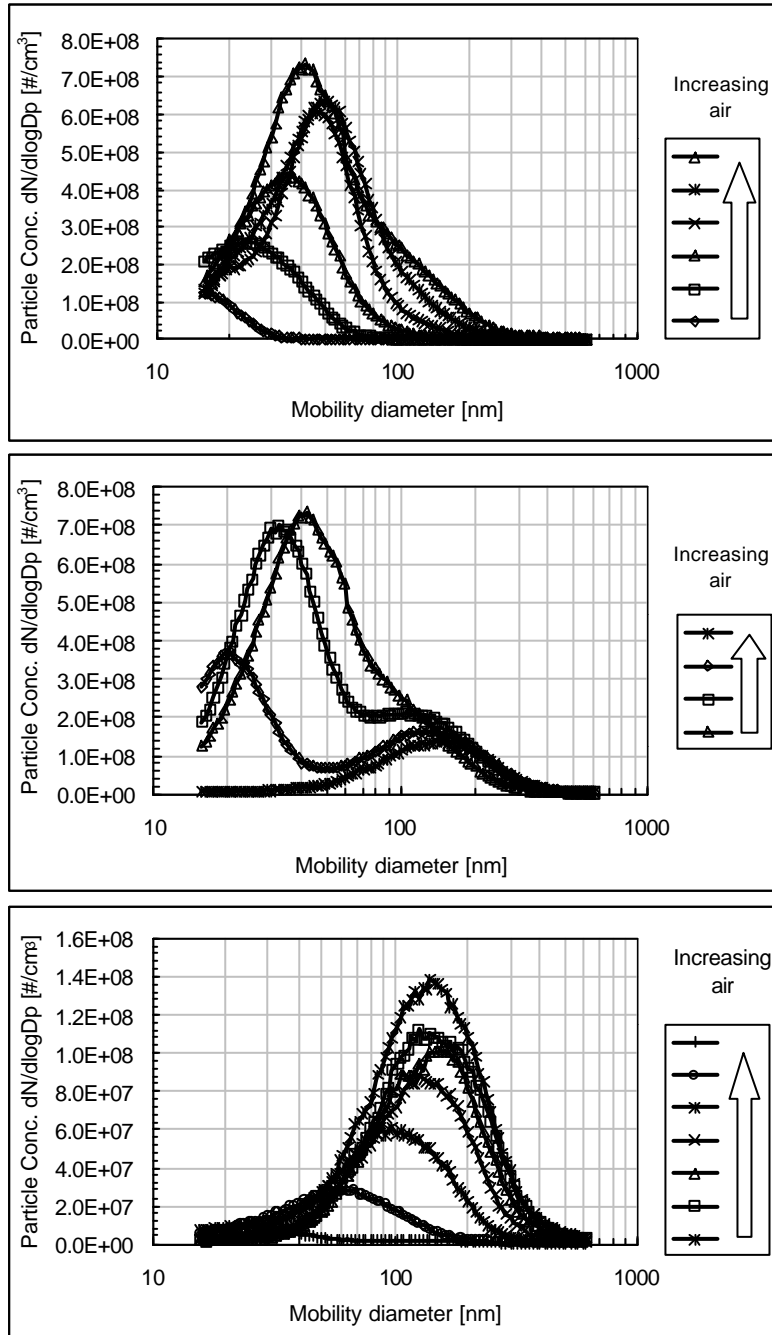
3.1. Parameters

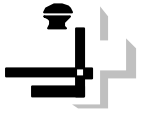
- Oxidation air
- N₂ in the fuel gas
- Fuel gas
- Flame height



3. Parameters of the CAST and their Influences

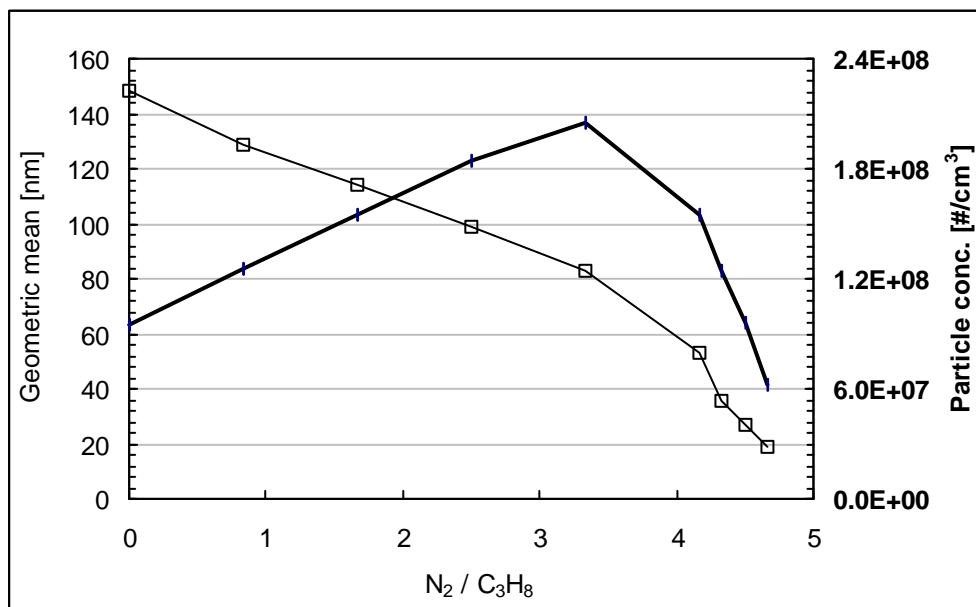
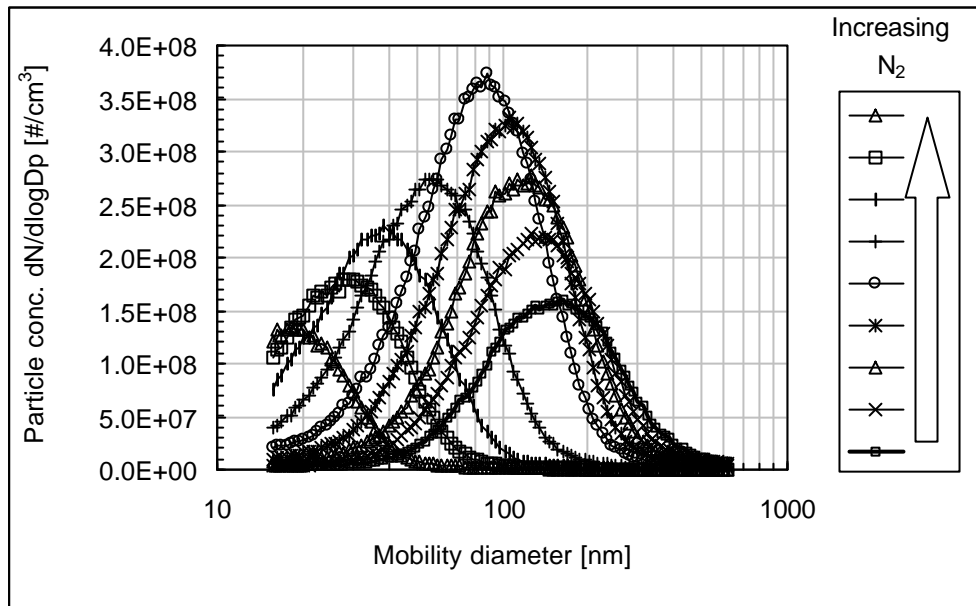
3.2. Influences of the Oxidation Air

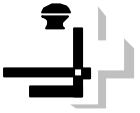




3. Parameters of the CAST and Their Influences

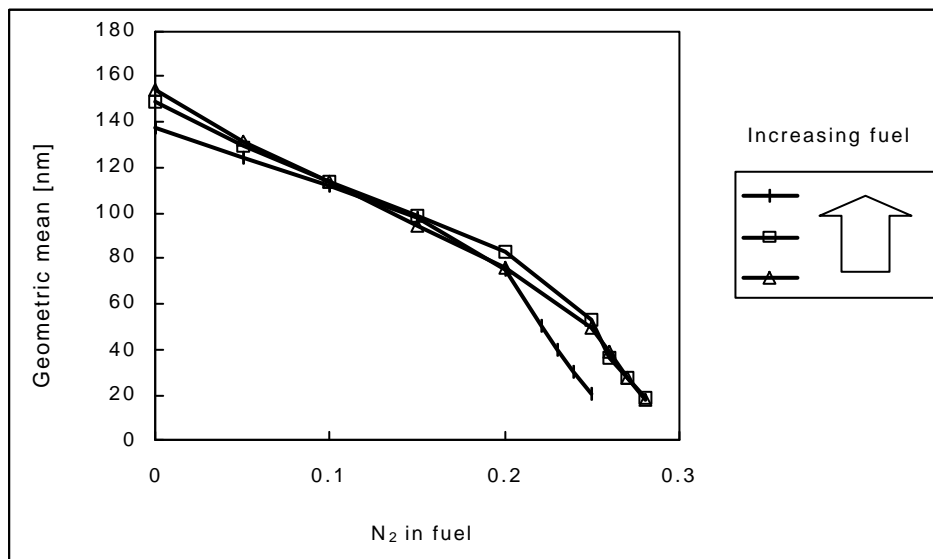
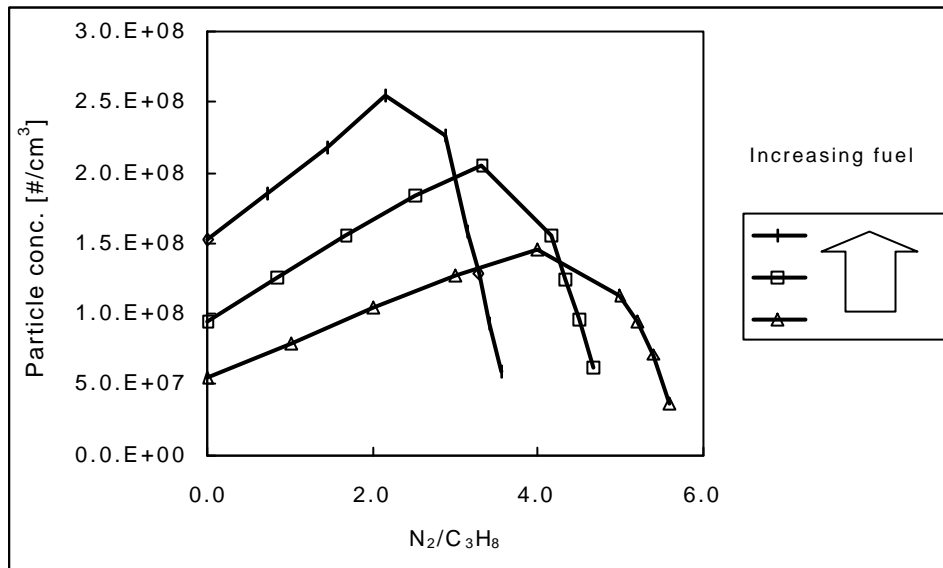
3.3. Influences of the Nitrogen in the Fuel Gas

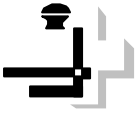




3. Parameters of the CAST and Their Influences

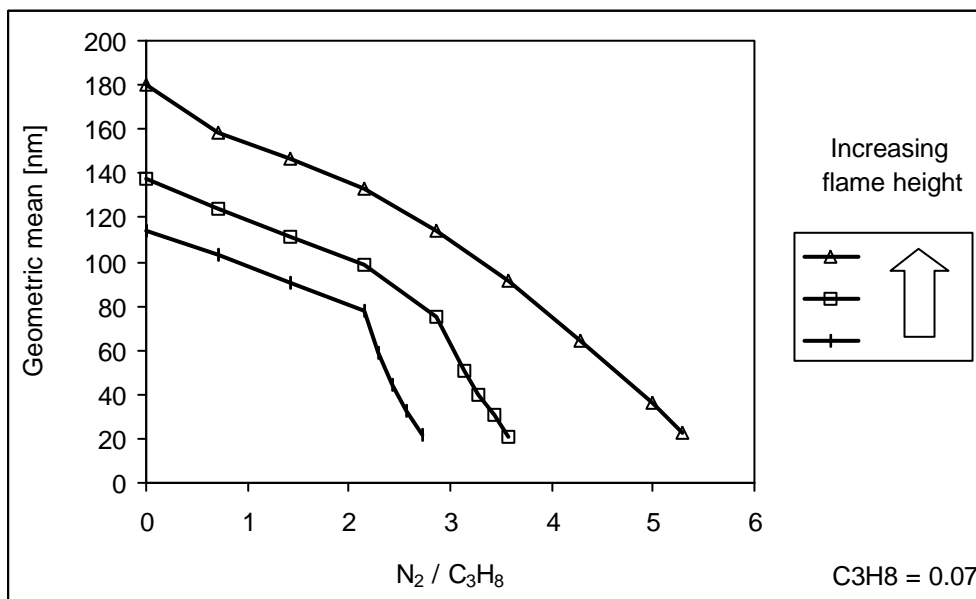
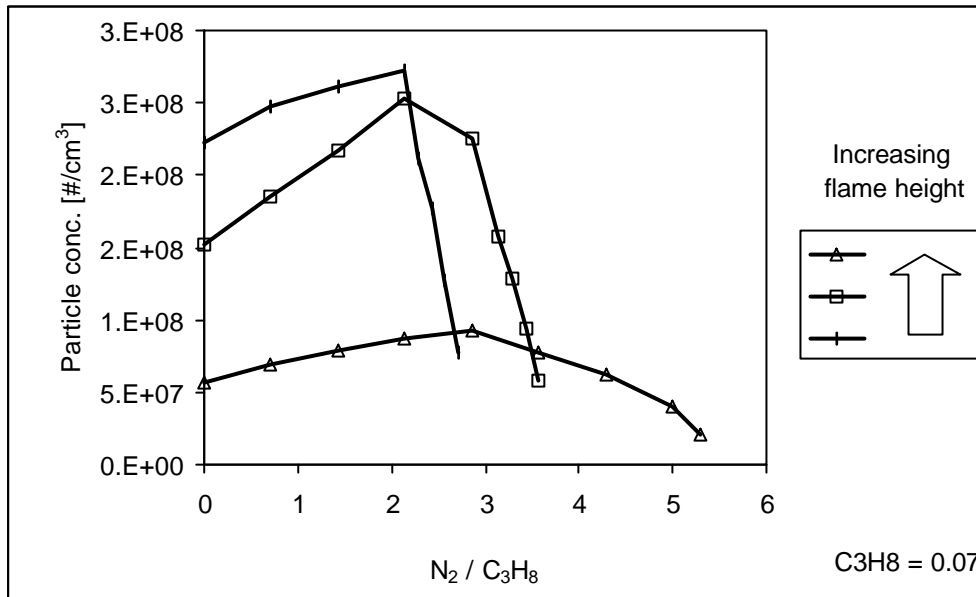
3.4. Influences of the Fuel Gas

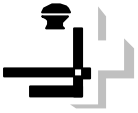




3. Parameters of the CAST and Their Influences

3.5. Influences of the Flame Height





4. Conclusions

1. The CAST is an important instrument for calibration and research
2. Real combustion aerosols, mainly of elementary carbon
3. Possibilities to produce uni- and bimodal size distributions
4. The N_2 -ratio in the fuel gas, the fuel amount, the oxidation air and the flame height are useful tools for generating particle size distributions of different characteristics.

5. References:

1. Lianpeng Jing, Standard Combustion Aerosol Generator (SCAG) for Calibration Purposes, 3rd ETH Workshop "Nanoparticle Measurement", ETH Hönggerberg Zürich, 9.-10. August 1999
2. Lianpeng Jing, Neuer Russgenerator für Verbrennungsrussteilchen zur Kalibrierung von Partikelmessgeräten, OFMET Info, Vol. 7, No. 2, 2000
3. Jürg Schlatter, Legal Aspects of Particle Measurements, 4th ETH Conference on Nanoparticle Measurement, ETH Hönggerberg Zurich, 7.-8. August 2000
4. Ulrich Matter, Stand alone soot generation - a new standard, adjustable in size and concentration, 4th ETH Conference on Nanoparticle Measurement, ETH Hönggerberg Zurich, 7.-8. August 2000