European Network on New Sensing Technologies for Air Pollution Control and Environmental Sustainability - *EuNetAir*

COST Action TD1105

WGs and MC Meeting at Cambridge, 18-20 December 2013

Action Start date: 01/07/2012 - Action End date: 30/06/2016

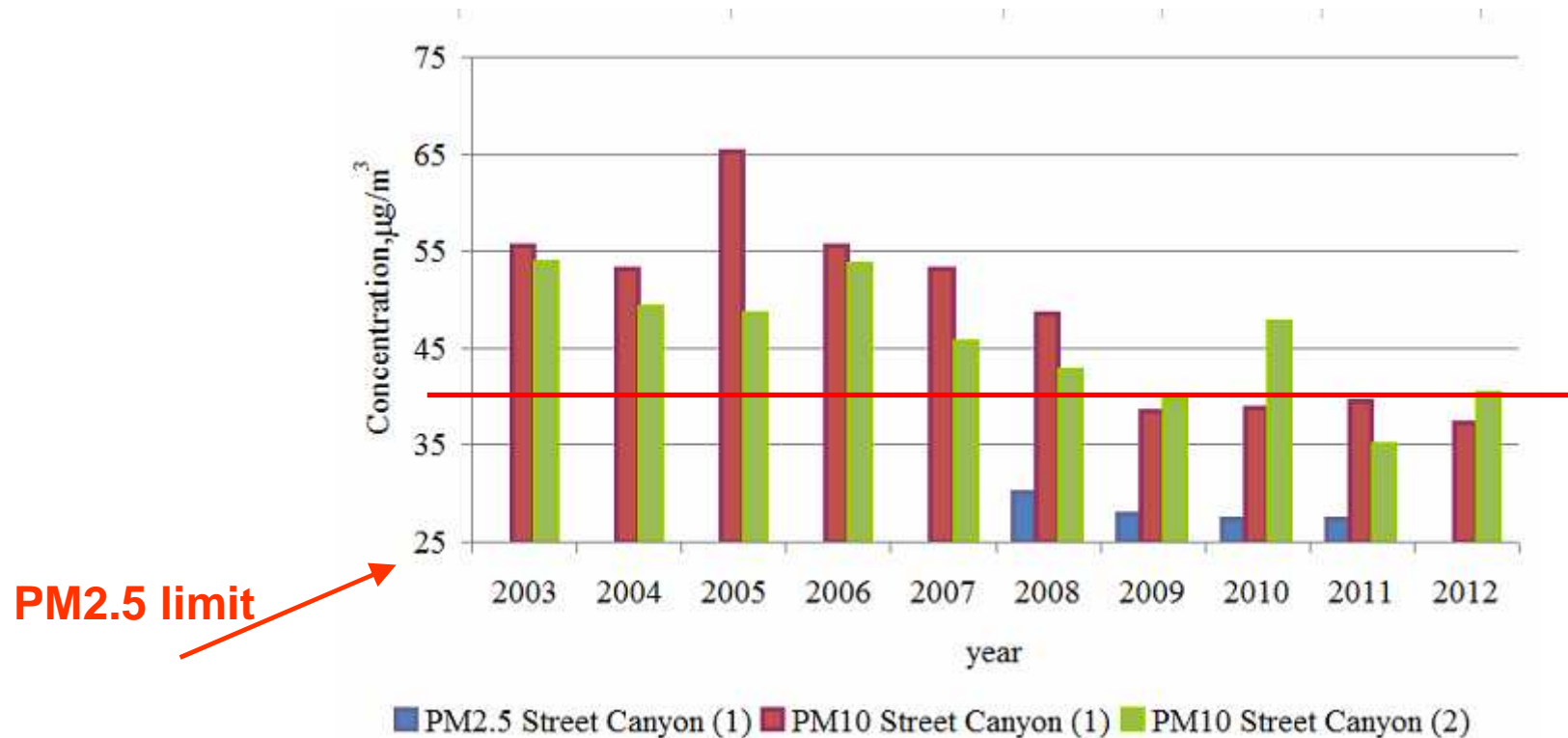Year 2: 1 July 2013 - 30 June 2014 (*Ongoing Action*)

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COST is supported
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through a European Commission contract

SEM-EDX ANALYSIS FOR SOURCE APPORTIONMENT OF PARTICULATE POLLUTION IN URBAN AREA

Why?

PM2.5 limit

Long-term changes of yearly PM concentrations in 2 parallel street canyons

More arguments …

Health effect & expected life time!

Money loss because of lost working days.

EU Commission claiming procedure for

400 000 EUR!!!

… but we are not alone, the same problem exist in another 17 Countries.

How?

Ordinary PM and compositional measurements (2003-2013)

Air quality gas data (2003-2013)

Filters were collected for further analysis

Traffic flow data (video-counting), 2010

Meteorological data (2003-2013)

Field measurements, April – June (2013)

Gravimetric sampling, ICP-MS, gas-chromotagraphy

Beta-gauge method (Thermo ESM Andersen FH 62I-R)
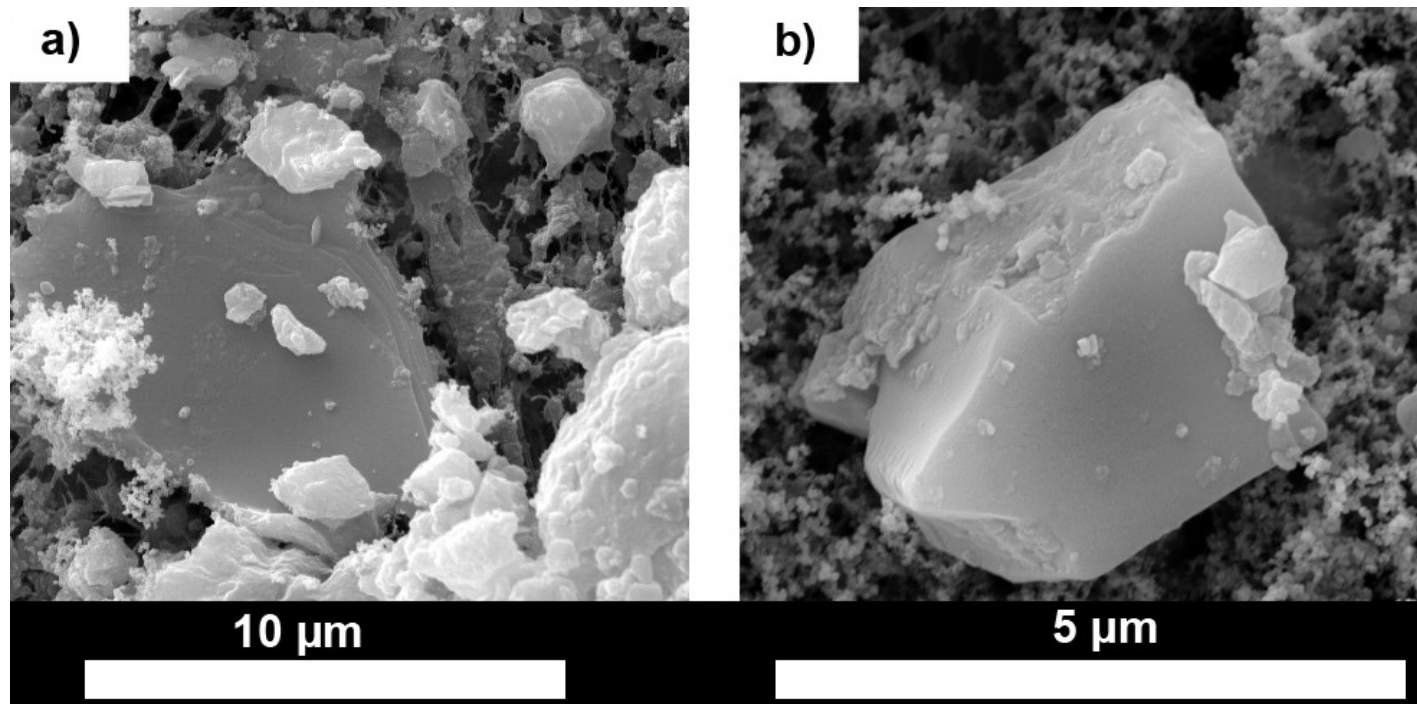
DOAS method for gaseous pollutants (OPSIS SM200)

General statistics

SEM-EDX (LYRA3 XMU, Tescan)

PCA, HCA (SPSS, PC-ORD 5.10)

Results of SEM-EDX analysis

Alumnosilicates (Si, Al, O + K, Ca, Na, Mg, Ti, Mn, Ni, Zn).
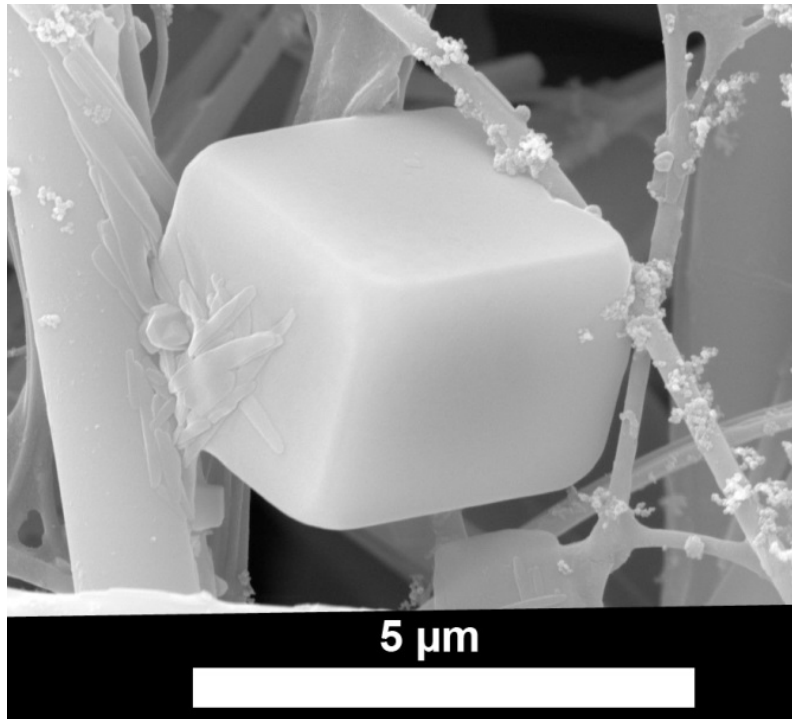Feldspar, daze, clay minerals, quartz.

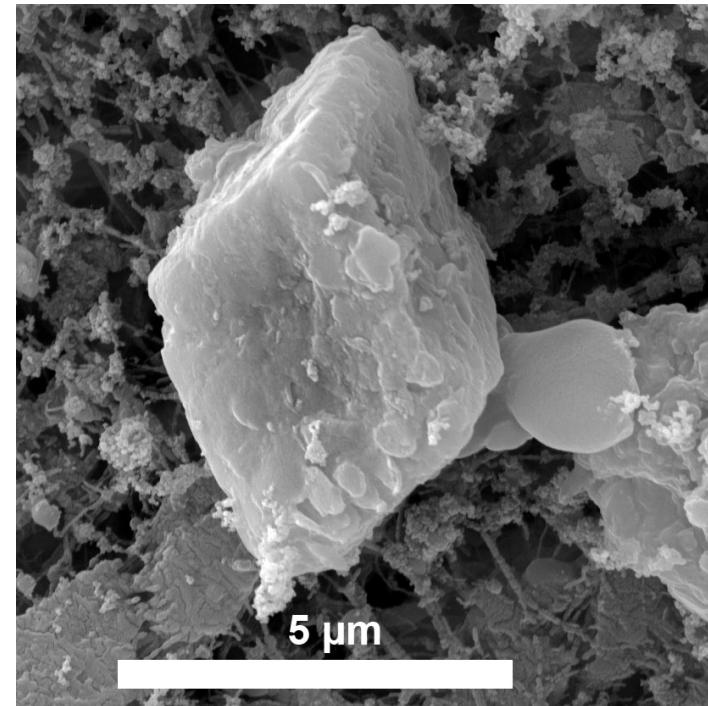
(a) Daze   **(b) quartz**

Carbonates
(CaMg(CO$_3$)$_2$; CaCO$_3$)
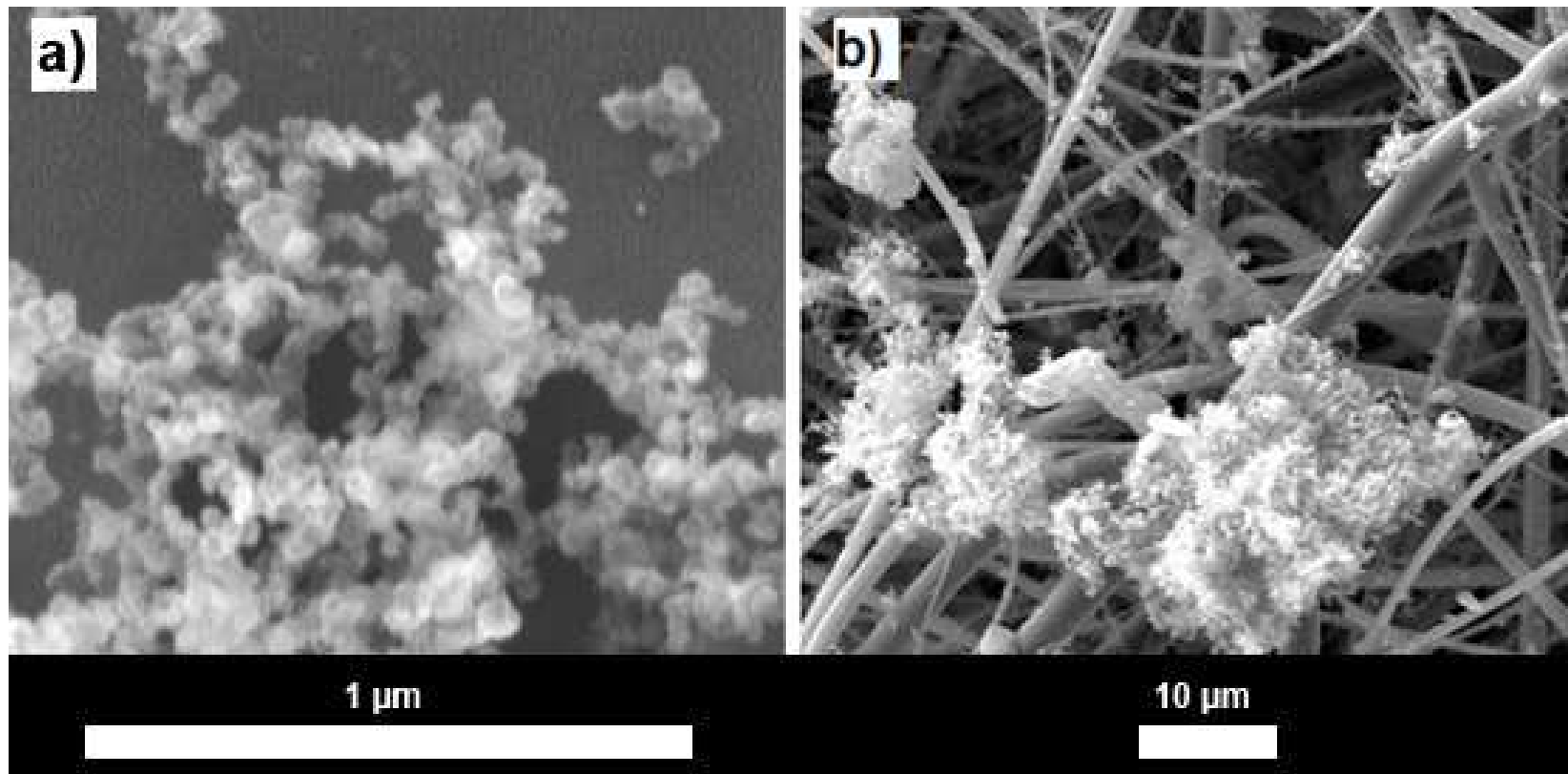

Sea salt particle

Dolomite mineral
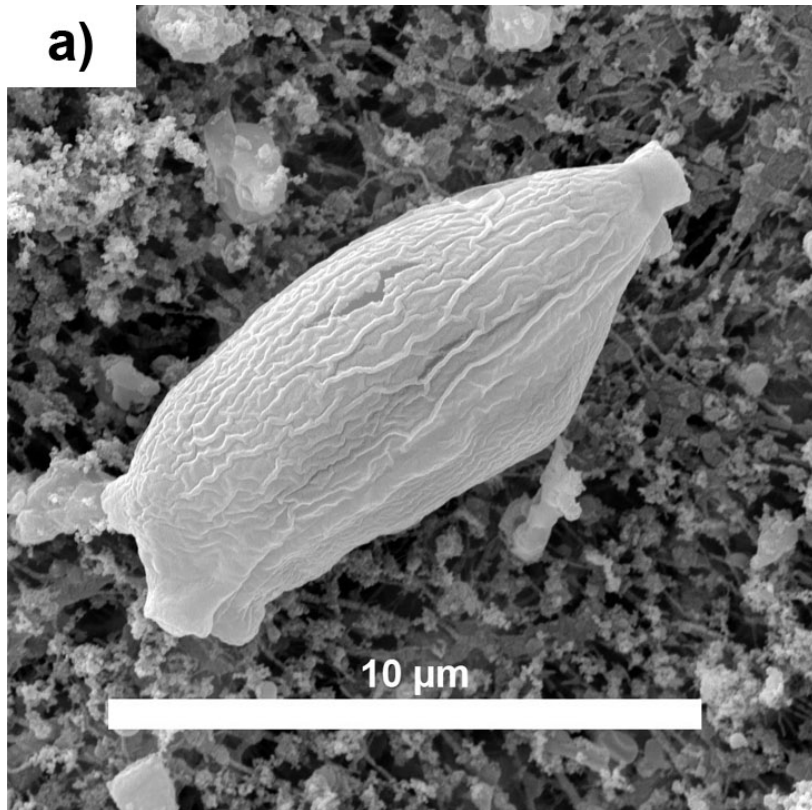
Soot, contains 80 – 96% of carbon
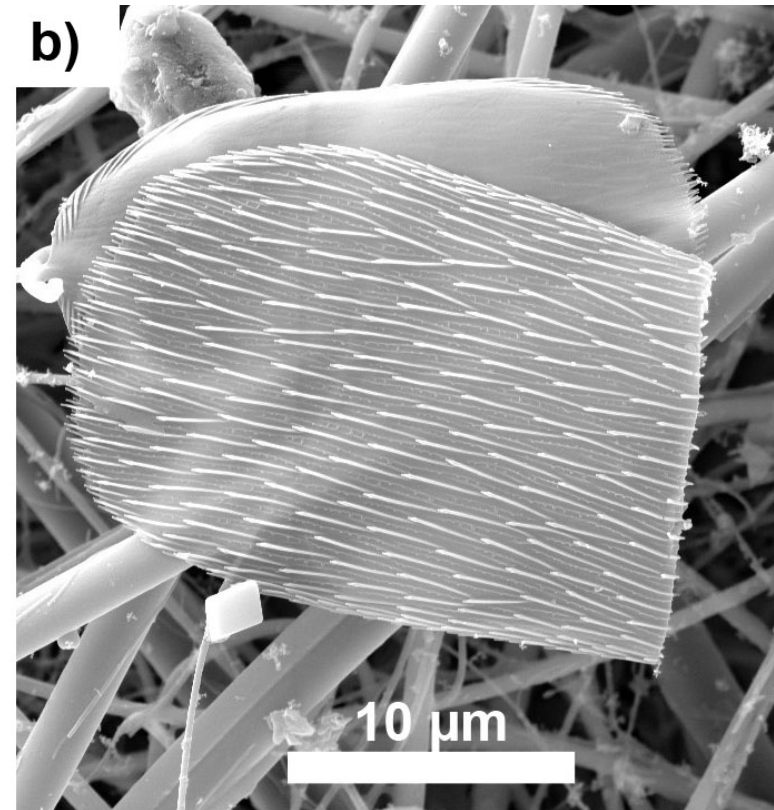

a) fresh soot,   b) soot conglomerates
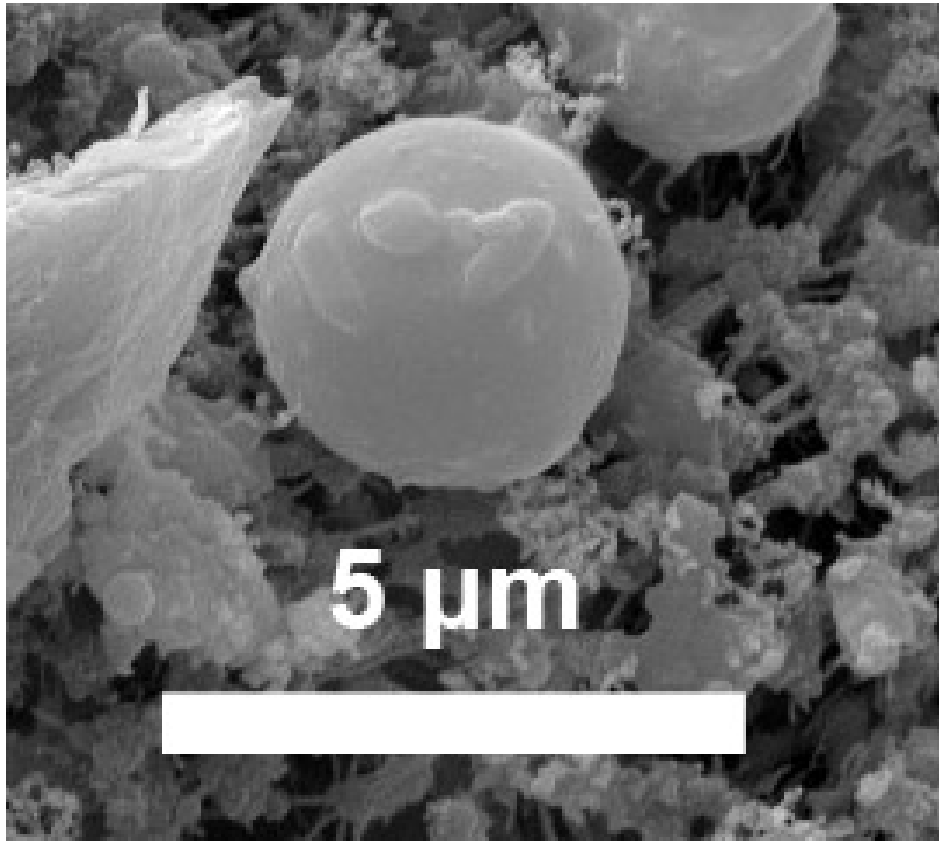
Biological particles
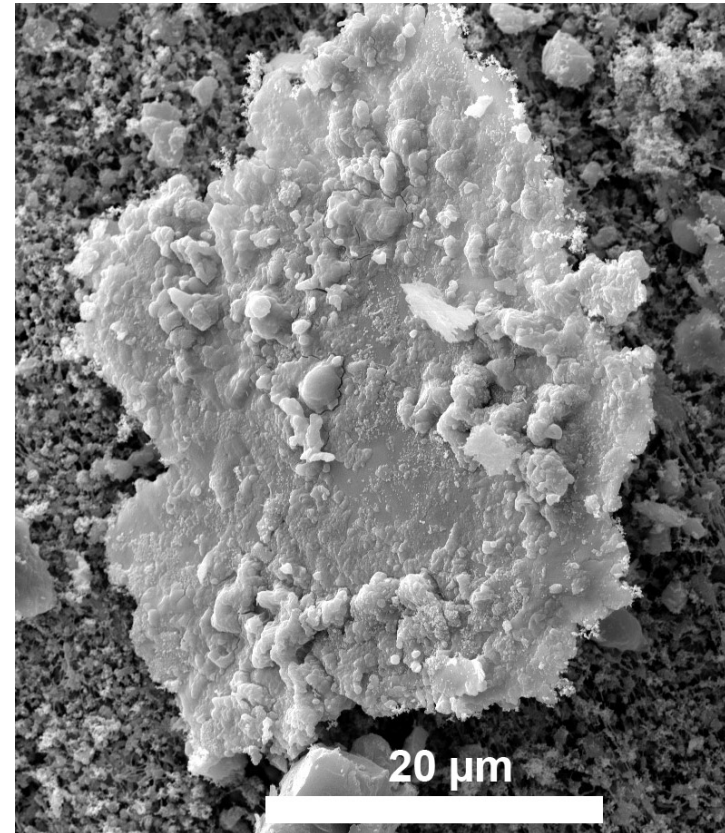
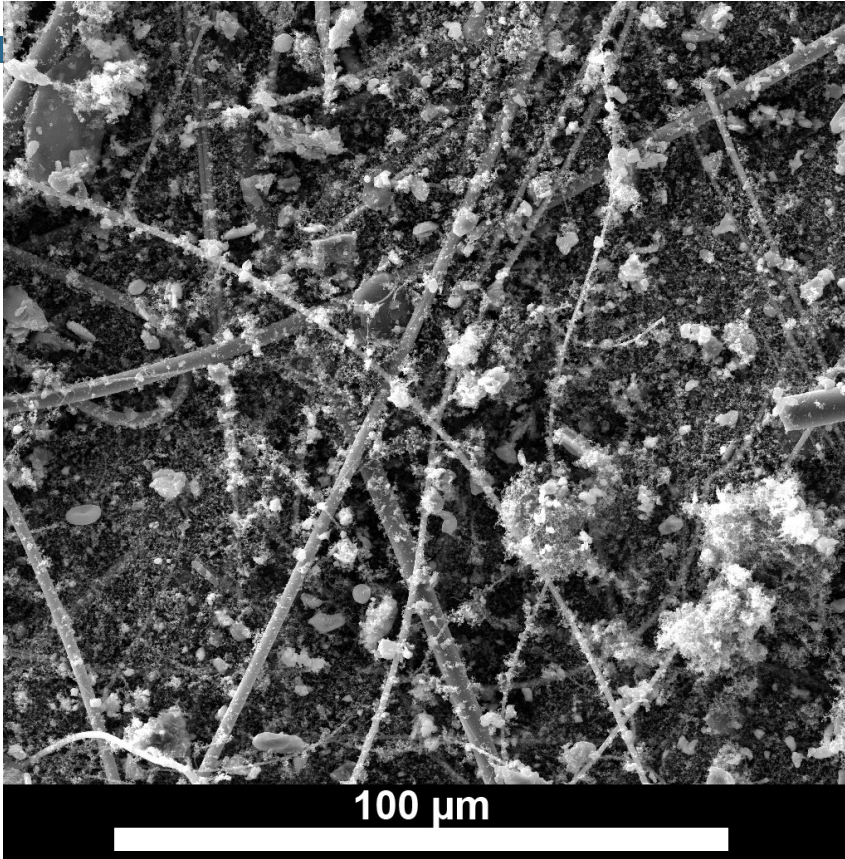

a) pollen

b) herb remain

Spherical particles

- Contains C, S, V, Ni, Fe, Ti.
- Size - 1 līdz 6 µm.

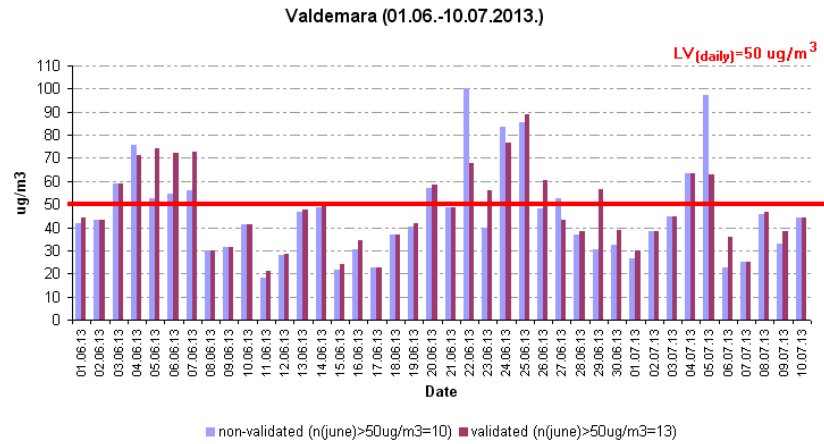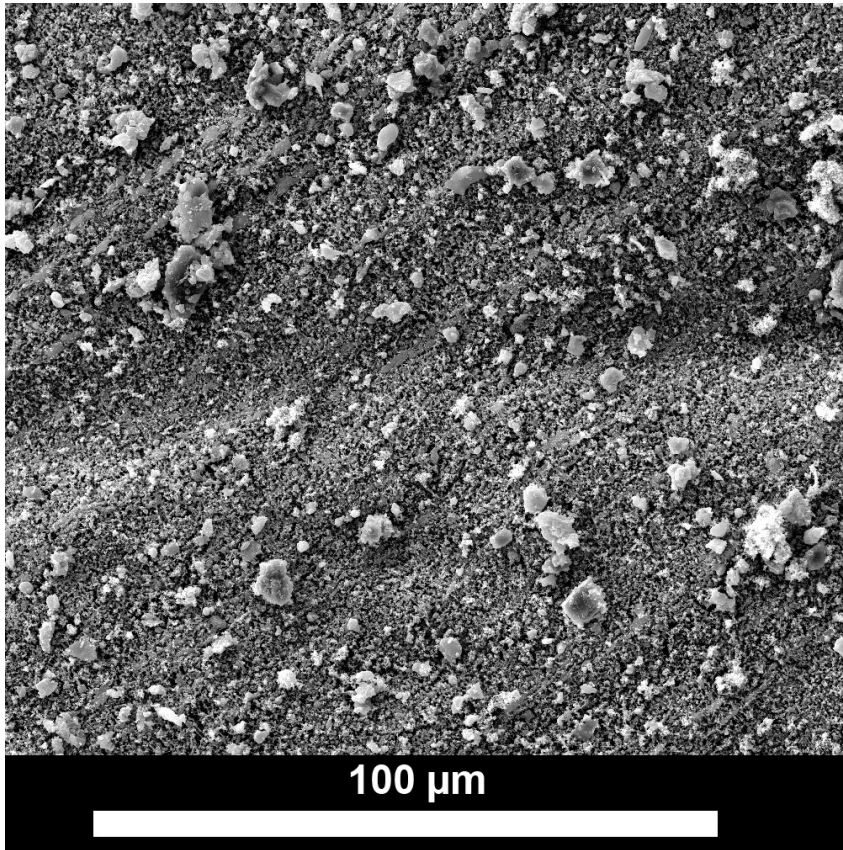# Metallical particles

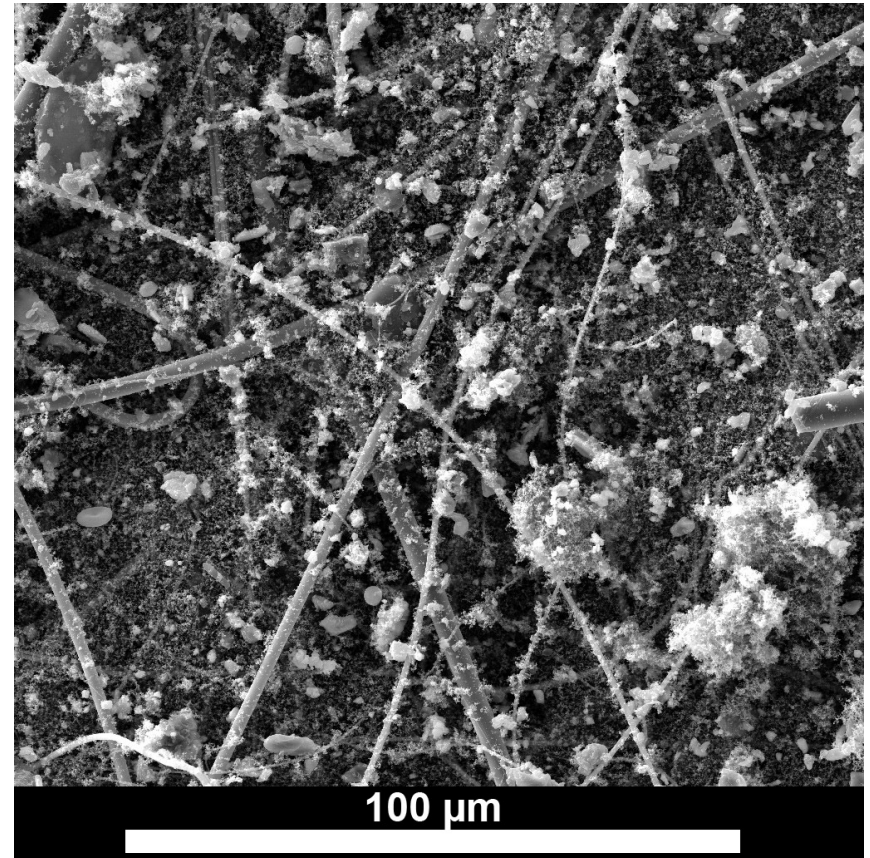Fe containing particle

Filter, 20.06.2013., 18:00 – 24:00

PM$_{10}$ concentrations from Valdemara street

01.06.2013 – 10.07.2013.

Evidence of traffic generated pollution – soot particles.

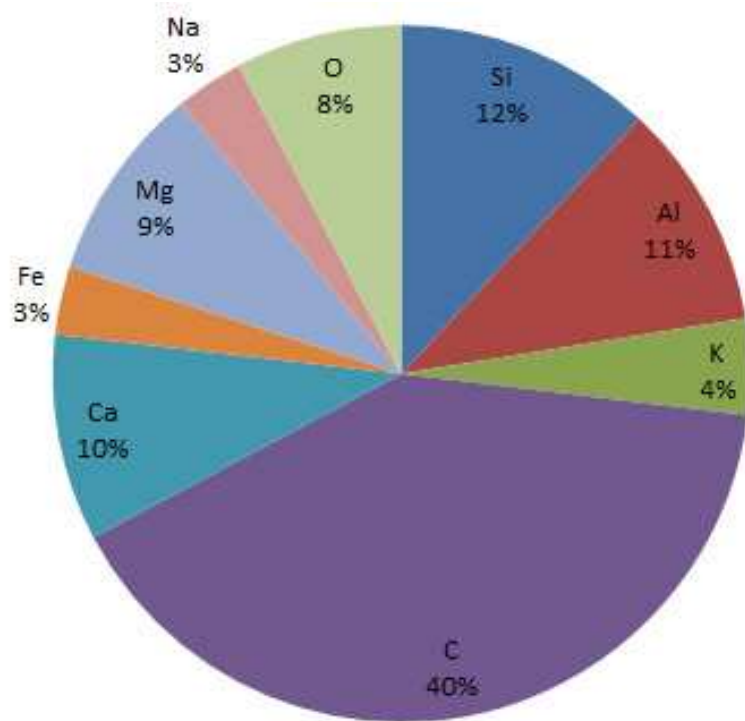20.06.2013., Brivibas Street

20.06.2013., 18:00 – 24:00, Valdemara Street

- A lot of mineral material

- Different exposition time scales

Frequency distribution, 24.06.2013.

Transport direct emissions : resuspension

1.5:1 − 1.5:1.1

Which means:

-50-60 % - direct emissions

-40-50 % - resuspension

Frequency distribution(%) in different sites

PM type	Type of territory				
	Residential, ½ storey	City/ residential	FreePort activities	Traffic	Mixed
Traffic direct	18-23	22-25	20-22	42-50	25-31
Mineral	18-34	23-29	18-27	30-40	31-38
Heating	20-25	12-23	14-44	2-5	8-12
Industrial	4-7	6-9	12-16	2-4	8-15
Biological	8-17	16-19	3-13	3-9	4-13
Sea salt	6-12	5-9	3-8	3-10	8-9

Main Conclusions

- Highest correlation pairs: PM_{10}-$PM_{2.5}$; PM_{10}-NO_2, $PM_{2.5}$-NO_2.

- Based on HCA have been prepared PM classification tree – NO_2 daily values above 34 $\mu g/m^3$ leeds to high (> 20 $\mu g/m^3$) $PM_{2.5}$ concentrations and high PM_{10} concentrations.

- High correlation between PM_{10} and Pb indicates traffic impact, but interesting that quite hight correation was found between PM_{10}-Ni (slow-fast draiving).