Supplemental Information

Use of Scanning Electron Microscopy/Energy Dispersive Spectroscopy (SEM/EDS) methods for the analysis of ambient particulate matter adhering to the skin surface

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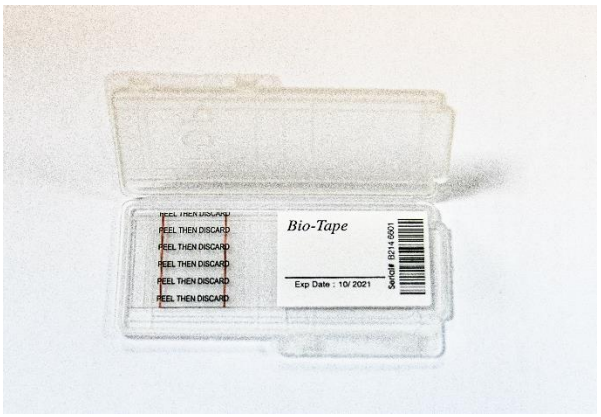
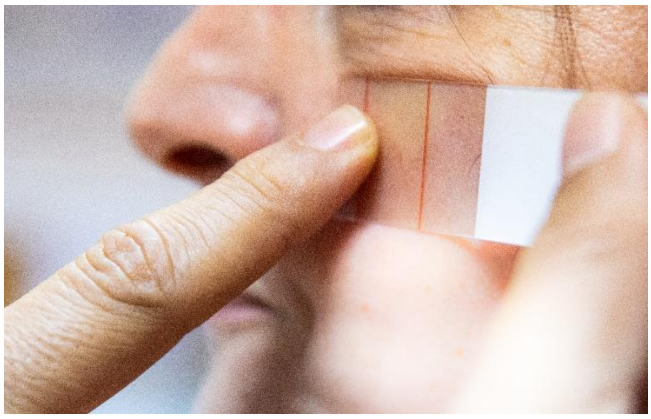
Tape stripping (TS) of the facial skin area was selected as sampling procedure, considering the long-term exposures of this skin region to ambient pollution, tremendously large, exposed surface area, and skin ability to trap small particles. In addition, the TS is a non-invasive procedure that utilizes a strip with adhesive properties to remove layers of SC from a predetermined section of the skin. Taking in account subsequent aerosol characterization method selected, Bio-TapeTM Slides (Zefon International, USA), a flexible plastic microscope slides with a pre-defined adhesive area and center-line marker were selected as sampling media of choice. Their smooth surface and low X-ray background allows high-quality SEM imaging and subsequent elemental analysis. The samples were stored at room temperature and analysed within few days after delivery.

a.



b.



Suplemental Figure SF1. Bio-Tape slide ready for use (a) and cheeks sampling proces (b).

Supplemental table ST1. Sample results: elemental composition and particle geometry (sample SK 41)

Chemical composition group	L (µm)	W (µm)	D (µm)	A^1 [µm^2]	P^2 [µm]	D_{eq}^3 [µm]	Aspect Ratio^4
Carbonaceous organic			4.58	16.5	14.4	4.58	1
			4.40	15.2	13.8	4.4	1
			2.31	4.2	7.3	2.31	1
			2.76	6.0	8.7	2.76	1
			4.42	15.3	13.9	4.42	1
			2.12	3.5	6.7	2.12	1
			3.63	10.3	11.4	3.63	1
			4.28	14.4	13.4	4.28	1
			2.72	5.8	8.5	2.72	1
			1.85	2.7	5.8	1.85	1
			7.42	43.2	23.3	7.42	1
			7.42	43.2	23.3	7.42	1

			7.45	43.6	23.4	7.45	1
			5.12	20.6	16.1	5.12	1
			4.21	13.9	13.2	4.21	1
			3.62	10.3	11.4	3.62	1
			1.87	2.7	5.9	1.87	1
			4.76	17.8	14.9	4.76	1
			4.31	14.6	13.5	4.31	1
			7.11	39.7	22.3	7.11	1
			7.27	41.5	22.8	7.27	1
			7.28	41.6	22.9	7.28	1
Average for Carbonaceous organic			4.59	19.39	14.40	4.59	1.00
Silicates	36.98	17.44		644.93	108.84	28.66	2.12
	48.51	21.42		1039.08	139.86	36.38	2.26
	28.40	12.80		363.52	82.40	21.52	2.22
	37.20	19.20		714.24	112.80	30.16	1.94
Average for Silicates	37.77	17.72		690.44	110.98	29.18	2.14
Chlorides (KCl)	39.57	332.13		13142.38	743.40	129.39	0.12
	44.26	27.86		1233.08	144.24	39.63	1.59
	19.54	17.04		332.96	73.16	20.60	1.15
	73.38	58.63		4302.27	264.02	74.03	1.25
	21.78	22.49		489.83	88.54	24.98	0.97
	4.49	3.81		17.11	16.60	4.67	1.18
	17.61	15.86		279.29	66.94	18.86	1.11
Average for salts	31.52	68.26		2828.13	199.56	44.59	1.05
Quartz like	17.77	10.77		191.38	57.08	15.61	1.65
Average for Quartz	17.77	10.77		191.38	57.08	15.61	1.65

Using the particle geometry data obtained (length - L and width - W or diameter - D), additional parameters were calculated;

[1]particle area – $A = L \times W$ or for circular forms $A = D^2\pi/4$

[2]perimeter – $P = 2L+2W$ or for circular forms $A=D\pi$

[3]equivalent circular diameter ($D_{eq} = 2*\sqrt{(A/\pi)}$) and

[4]aspect ratio ($AR = L/W$).

Supplemental Table ST2. Results for sample SK 41

Sample Code: SK 41	Number of particles observed	C min	C max	Average Area	Average Perimeter	Average Equivalent Diameter	Average Aspect Ratio
Composition	Counts	counts/cm^2	counts/cm^2	µm^2	µm	µm	
Carbonaceous Bioaerosols	0	0	351				
Carbonaceous organic	22	1313	3172	19.39	14.40	4.59	1.00
Salts	0	0	351				

Sulphates	4	104	975	690.44	110.98	29.18	2.14
Quartz like	7	268	1374	2828.13	199.56	44.59	1.05
Metal's rich	0	0	351				
Metal's high	0	0	351				
Mixed metals reach	1	2	531	191.38	57.08	15.61	1.65
Silicates	0	0	351				
Other – Unclassified	0	0	351				
Total	34	2242	4525	932.34	95.50	23.49	1.46

The lowest and highest number of particles from each group, adhered per square centimeter (cm^2) of the skin exposed were calculated with 95 % confidence, assuming the hypothesis of Poisson distribution of particles on skin surface.