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Supplement of

Influence of soot aerosol properties on the counting efficiency of instruments used for the periodic technical inspection of diesel vehicles

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9 **Table S1**: Setpoints of soot particle generators miniCAST 6204 C, miniCAST 5201 BC, Mini Inverted Soot Generator (MSIG), and bigCAST used

10 in this study.

Soot generator	Setpoint	Propane (ml/min)	Mix. air (l/min)	Ox.air (ml/min)	Mix.N_2 (ml/min)	Dil. air (l/min)	Quench N_2 (l/min)	DME (ml/min)	Total number concentration (cm^{-3})	C/O ratio	EC/TC mass-fraction (%)	GMD$_{mob}$ (nm)	GSD
MSIG	100 nm	112	-	-	-	6.5	-	64	6.33E+04 ± 2.73E+03	0.05	62.4	97.3 ± 0.7	1.74 ± 0.02
min-iCAST6204C	50 nm	25	430	-	10	5	2	-	1.30E+05 ± 1.88E+04	0.42	57.2	51.0 ± 0.2	1.42 ± 0.01
	70 nm	25	510	-	10	5	2	-	1.63E+05 ± 2.11E+04	0.27	27.9	74.8 ± 1.9	1.54 ± 0.08
	80 nm	25	510	-	10	5	2	-	1.21E+05 ± 6.43E+03	0.34	77.8	85.0 ± 1.2	1.53 ± 0.01
	100 nm	25	560	-	10	5	2	-	1.29E+05 ± 6.08E+03	0.32	41.9	97.8 ± 3.3	1.59 ± 0.01
min-iCAST5201BC	50 nm	60	407	1100	0	10	7	-	1.17E+05 ± 4.84E+03	0.29	100	56.1 ± 1.0	1.60 ± 0.02
	70 nm lean	60	375	1100	0	10	7	-	1.22E+05 ± 2.65E+03	0.29	94.6	80.3 ± 0.3	1.59 ± 0.01
	70 nm rich	70	0	1130	0	10	7	-	1.34E+05 ± 2.65E+03	0.46	73.7	79.2 ± 0.5	1.69 ± 0.00
	80 nm	60	355	1100	0	10	7	-	1.19E+05 ± 3.63E+03	0.29	98.1	86.8 ± 0.8	1.57 ± 0.01
	100 nm lean	60	73	1500	0	10	7	-	1.63E+05 ± 1.63E+03	0.27	97.4	99.8 ± 1.3	1.63 ± 0.01
	100 nm rich	61	200	1100	0	10	7	-	1.16E+05 ± 2.17E+03	0.33	65.7	101.9 ± 1.0	1.58 ± 0.00
BigCAST	50 nm	60	1.55	-	355	10	11	-	1.69E+05 ± 2.69E+03	0.28	50.9	52.5 ± 0.3	1.57 ± 0.01

	70 nm	58	1.60	-	309	10	15	-	1.17+0E5 ± 1.03+0E3	0.26	62.2	71.6 ± 0.9	1.54 ± 0.00
	80 nm	58	1.6	-	230	10	13	-	1.53+0E5 ± 6.57+0E3	0.26	81.2	81.5 ± 0.8	1.53 ± 0.01
	100 nm	58	1.6	-	295	10	15	-	1.27+0E5 ± 3.07+0E3	0.26	100.0	98.9 ± 0.2	1.60 ± 0.00
Vehicle Euro 5b	56 nm	Diesel fuel and air							1.04E+05 ± 2.37E+03	-	83.5	56.4 ± 0.7	2.12 ± 0.00

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Legend (top-left of plot):
- 100 nnm, MISG
- 50 nm, MiniCAST 6204 C
- 70 nm, MiniCAST 6204 C
- 80 nm, MiniCAST 6204 C
- 100 nm, MiniCAST 6204 C
- 50 nm, MiniCAST 5201 BC
- 70 nm, MiniCAST 5201 BC, fuel-lean
- 70 nm, MiniCAST 5201 BC, fuel-rich
- 80 nm, MiniCAST 5201 BC
- 100 nm, MiniCAST 5201 BC, fuel-lean
- 50 nm, BigCAST
- 70 nm, BigCAST
- 80 nm, BigCAST
- 100 nm, BigCAST
- Vehicle Euro 5b

Y-axis: *Normalized particle number concentration*
X-axis: *Electrical mobility diameter* (nm)

Figure S1: Normalised particle number size distributions of soot aerosols produced by the miniCAST 6204 C, miniCAST 5201 BC, Mini Inverted Soot Generator (MISG), bigCAST and a Euro 5b diesel vehicle.

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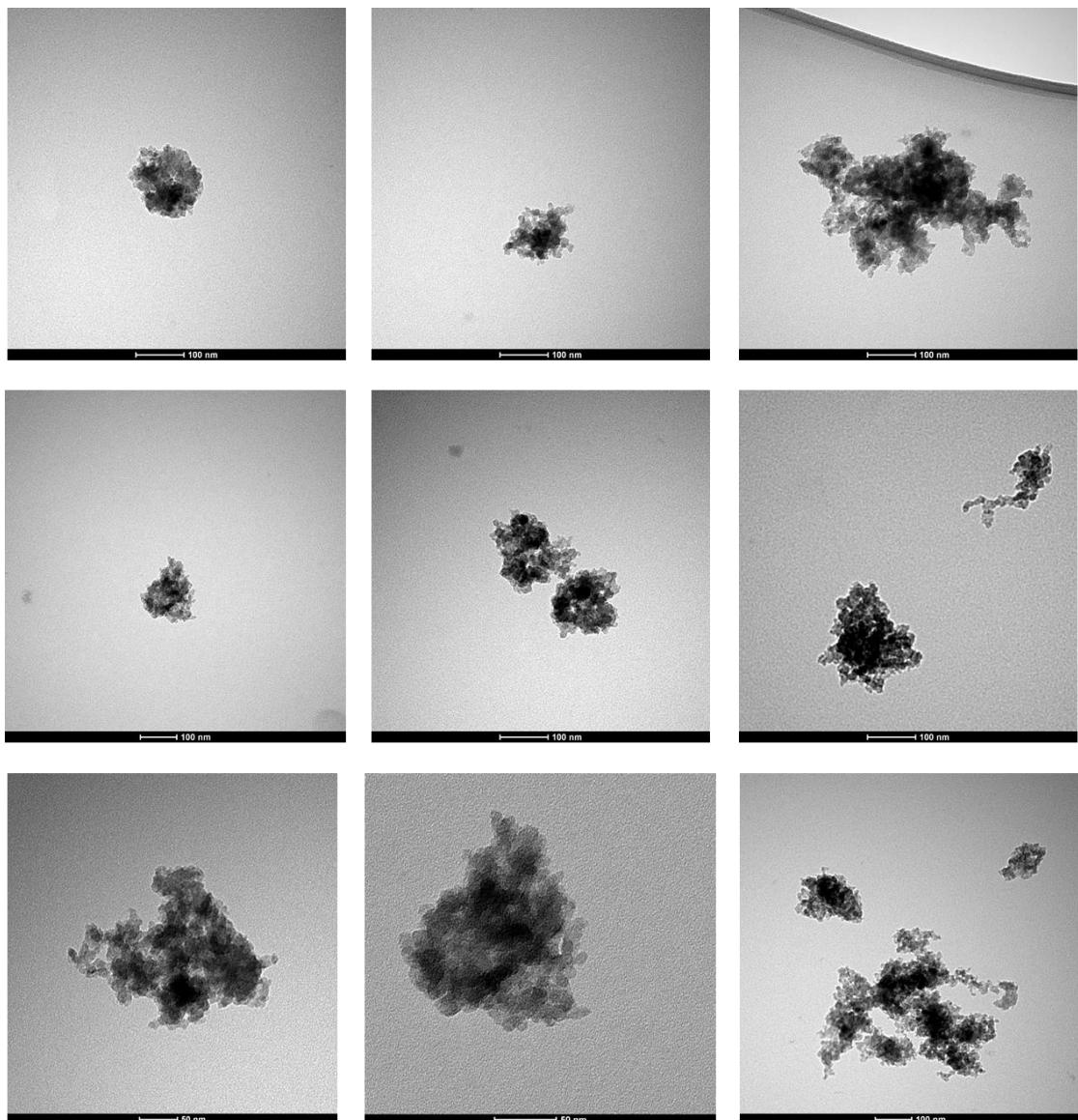
Figure S2: TEM images of polydisperse soot aerosol with a GMD_{mob} of 102 nm generated by the mini-inverted soot generator (MISG).
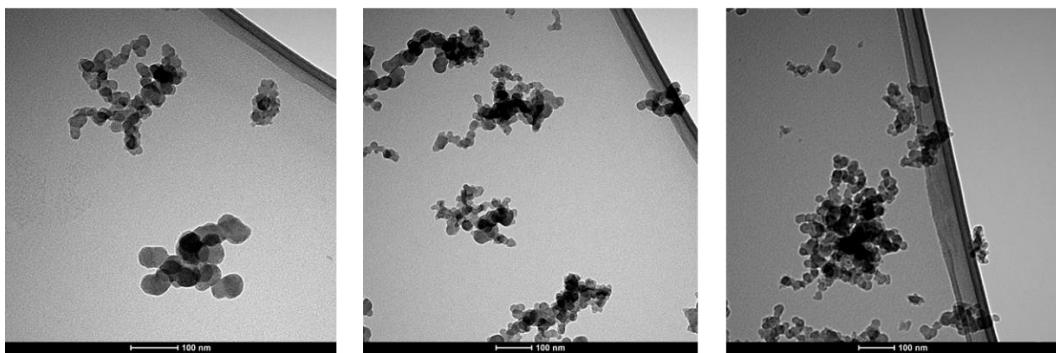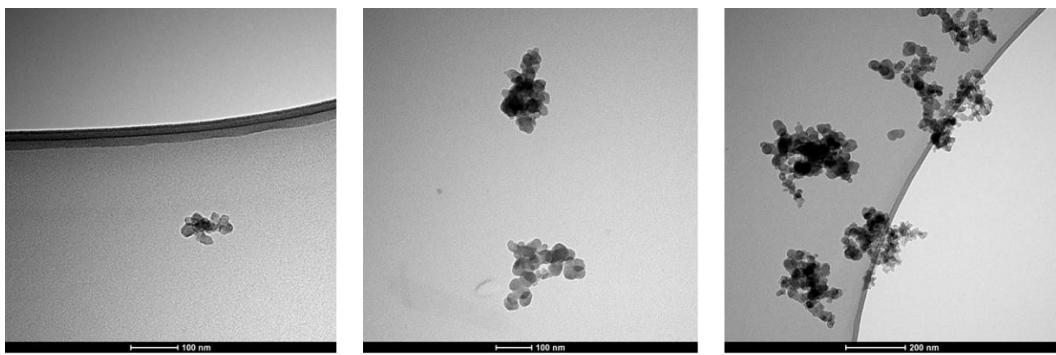
Figure S3: TEM images of polydisperse soot aerosol with a GMD_{mob} of 56 nm generated by the Euro 5 b test vehicle.
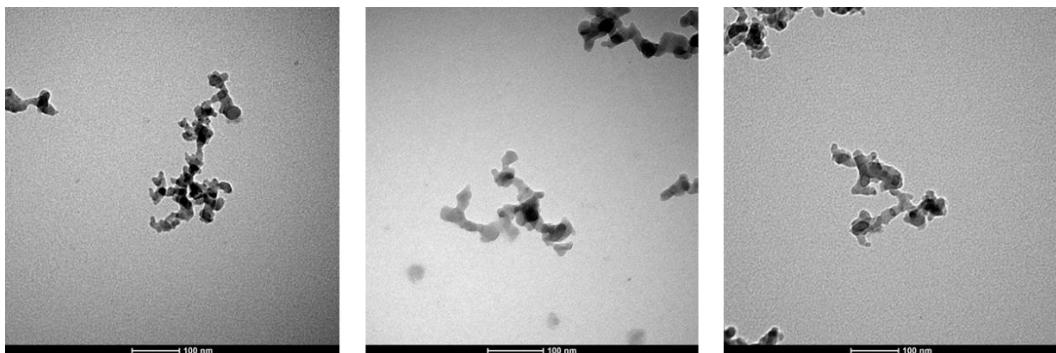

Figure S4: TEM images of polydisperse soot aerosol with a GMD_{mob} of 100 nm generated using a miniCAST 6204 C generator.
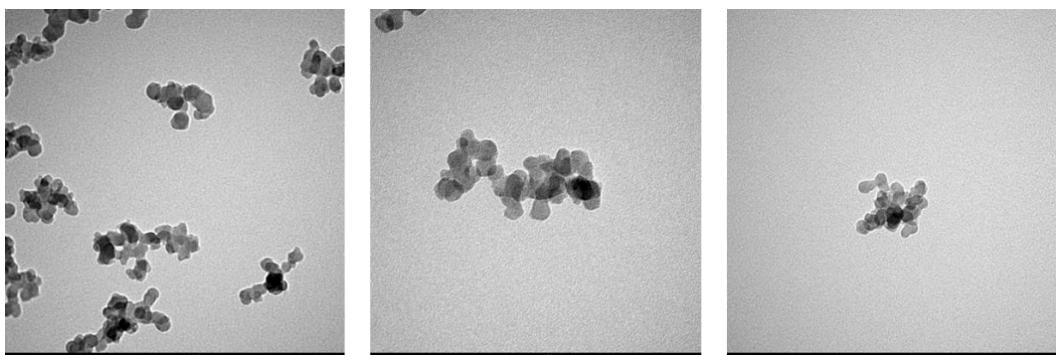
**Figure S5:** TEM images of polydisperse soot aerosol with a GMD_{mob} of 100 nm generated using a BigCAST generator.

100'000 cm⁻³ is not used — see figure.

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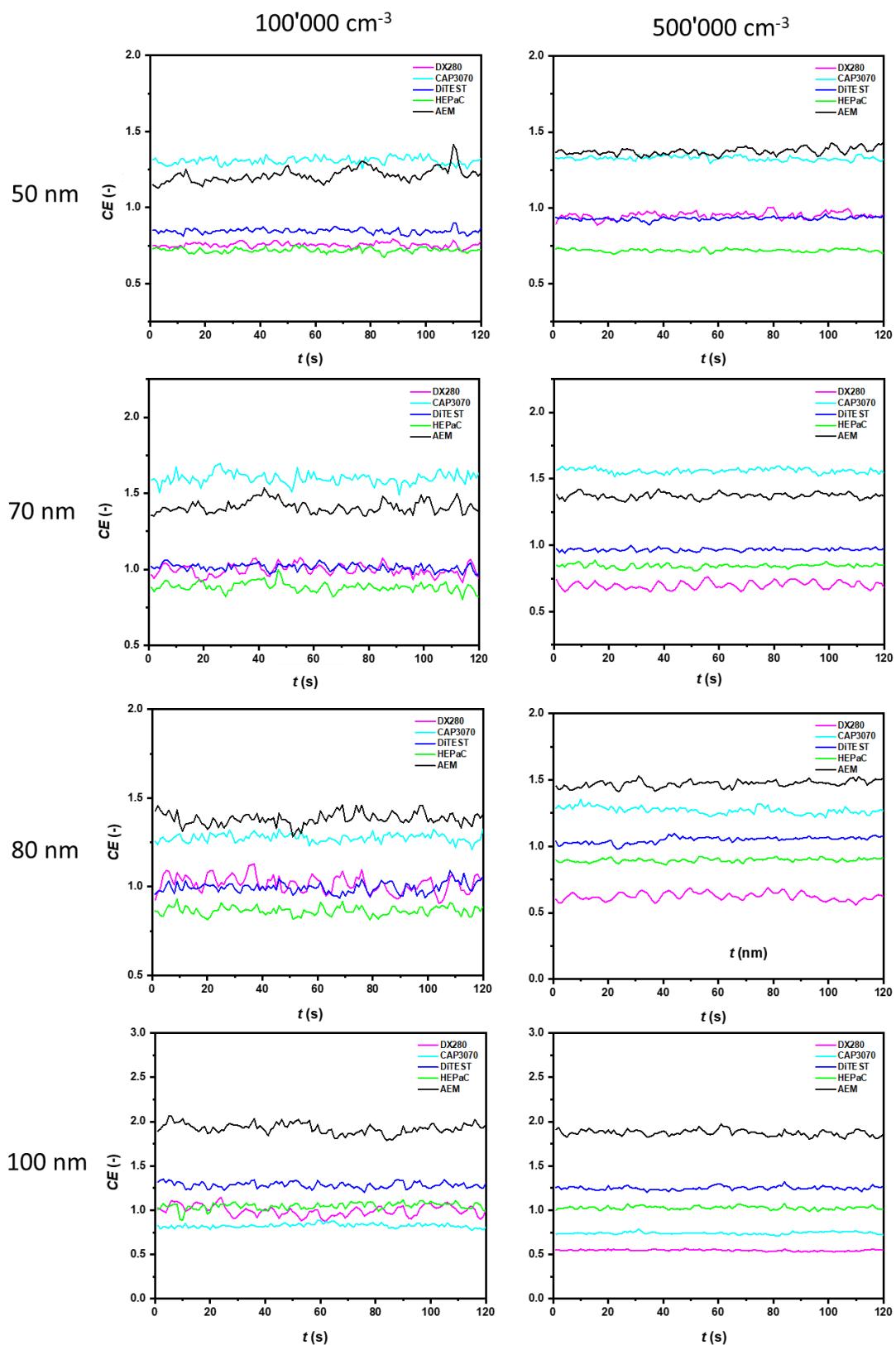
Figure S6: Counting efficiency (CE)-profile of six different PN-PTI counters: AEM, HEPaC, DiTEST, CAP3070, DX280, Knestel; for a duration of 2 min. Soot generator: bigCAST.

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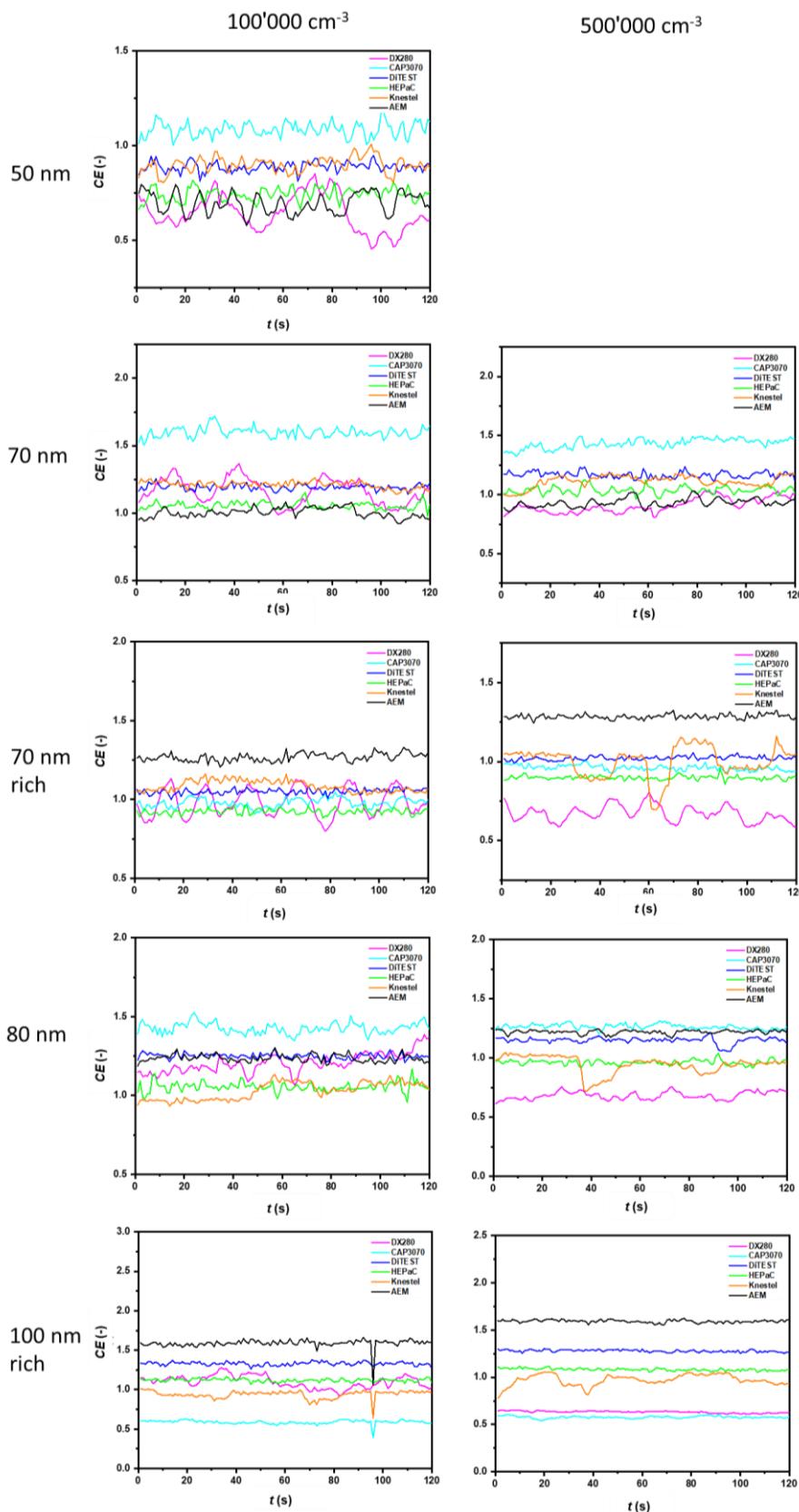

Figure S7: Counting efficiency (CE)-profile of six different PN-PTI counters: AEM, HEPaC, DiTEST, CAP3070, DX280, Knestel; for a duration of 2 min. Soot generator: miniCAST 5201 BC.
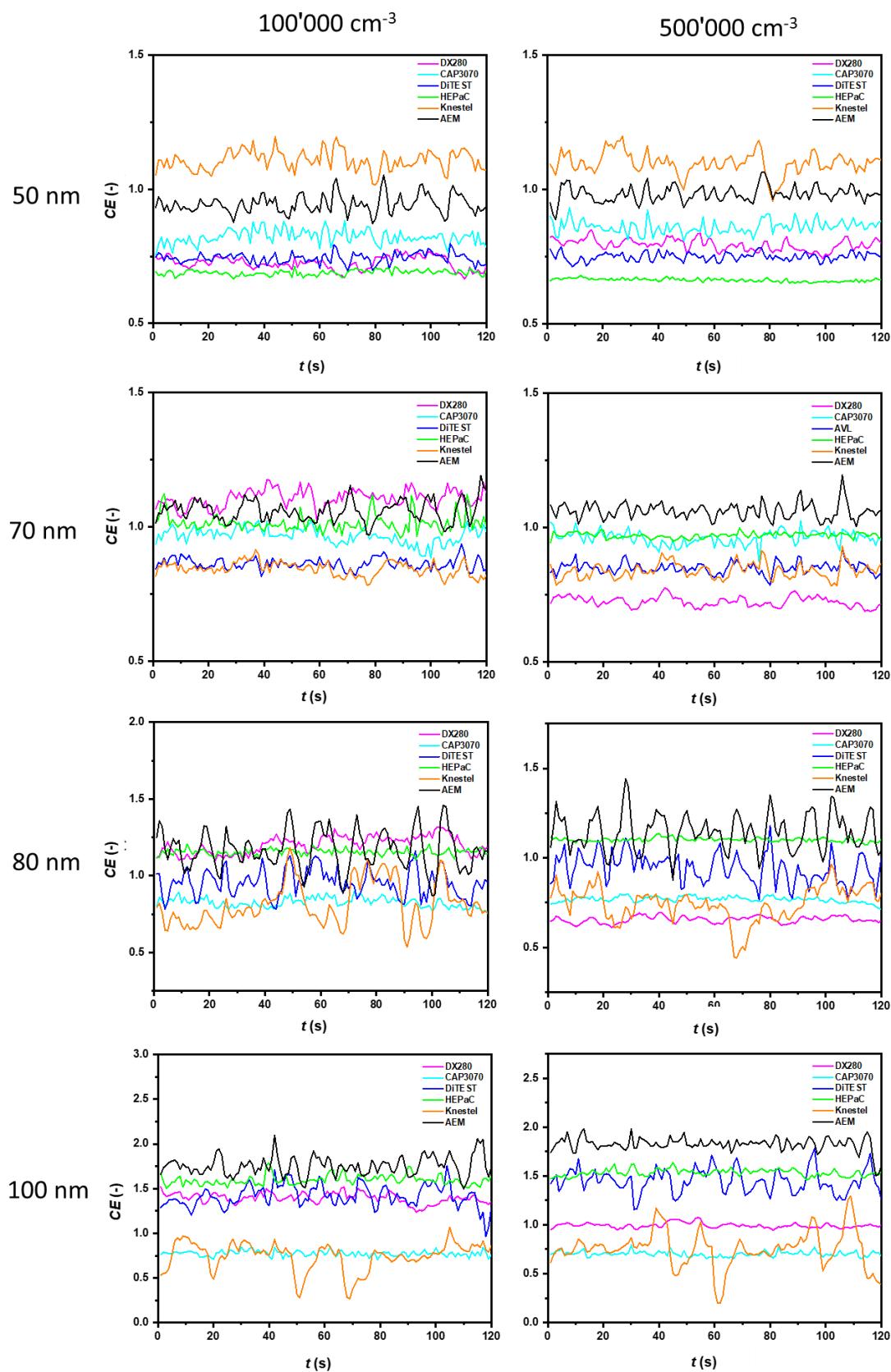
Figure S8: Counting efficiency (CE)-profile of six different PN-PTI counters: AEM, HEPaC, DiTEST, CAP3070, DX280, Knestel; for a duration of 2 min. Soot generator: miniCAST 6204 C.

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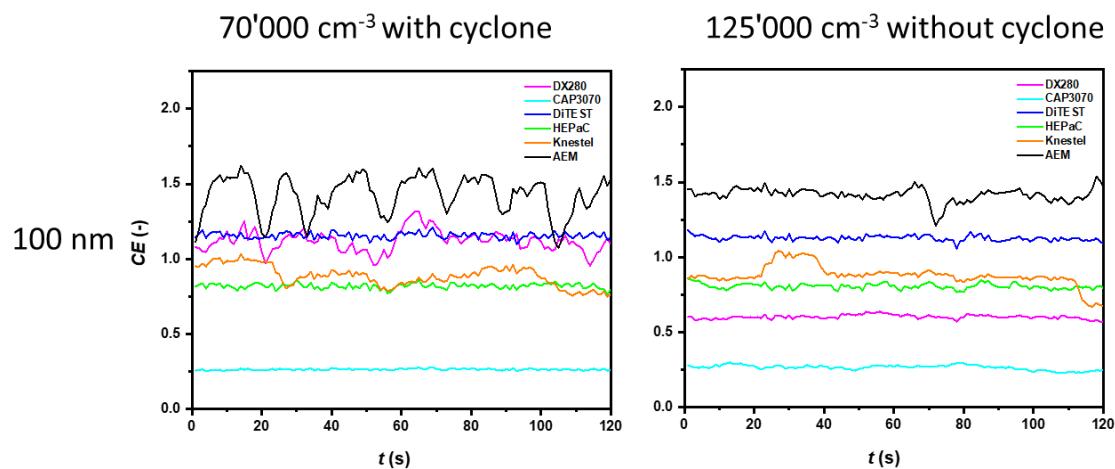
Figure S9: Counting efficiency (CE)-profile of six different PN-PTI counters: AEM, HEPaC, DiTEST, CAP3070, DX280, Knestel; for a duration of 2 min. Soot generator: mini-inverted soot generator (MISG).