



*Supplement of*

**Development, characterization, and application of an improved online reactive oxygen species analyzer based on the Monitor for AeRosols and Gases in ambient Air (MARGA)**

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## S1. PQN experiment details

First, we configure PQN solutions with concentrations of 0.01, 0.02, 0.025, 0.05, 0.085  $\mu\text{M}$ . Then, take 1.5 mL PQN solution and 5 mL 0.1 M potassium phosphate solution (adjust the pH to 7.4 after preparation) and mix in a 15 mL reaction flask. Next, add 0.5 mL of 1mM DTT to the reaction mixture, and place it in a constant temperature oscillator (THZ-D, Suzhou Peiying Experimental Equipment Co., Ltd.) at 37 °C and a rotation speed of 250 r/min. At the specified time interval (0, 10, 20, 30, 40 minutes), take out 0.5 mL of the reaction mixture and transfer it to another vial containing 0.5 mL of 10% w/v trichloroacetic acid (TCA) for termination reaction between DTT and sample solution. Then, add 50  $\mu\text{L}$  of 1 mM DTNB (5,5'-dithiobis (2-nitrobenzoic acid)) to react with the remaining DTT in the solution. Finally, add 2 mL of 0.4 M Tris buffer (0.4 M Tris + 20 mM EDTA, adjust the pH to 8.9 after preparation), and use a spectrophotometer to detect the absorbance at a wavelength of 412 nm, where the spectrophotometer includes an ultraviolet-visible (UV-VIS) light source (Ocean Optics DT-mini-2) and a multi-wavelength light detector (USB4000 micro fiber spectrometer), and the data acquisition software (Spectra Suite) to record the absorbance intensity at 412 and 700 nm (selected as the baseline absorbance of TNB).

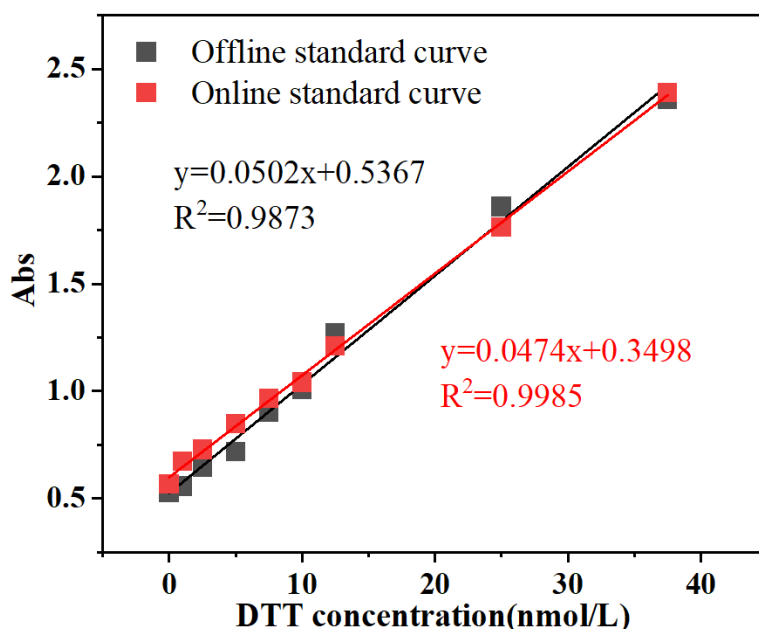
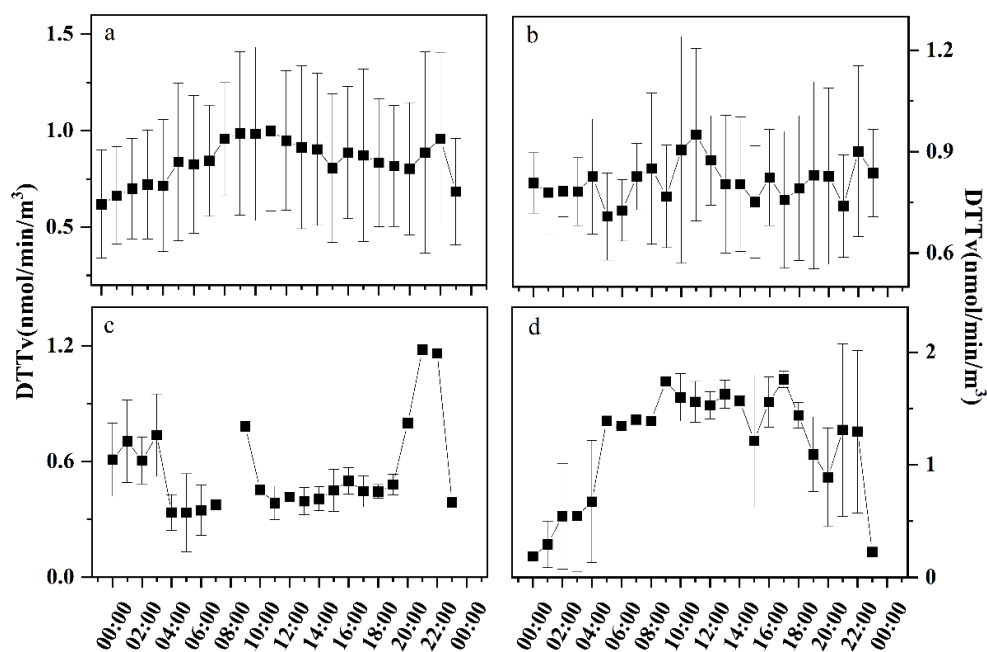


Figure S1. Online and offline DTT standard curve

**Table S1.** Comparison of the results of this experiment and previous studies

	Fang et.al	Puthussery et.al	This experiment
$\Delta$ DTT of blank sample ( $\text{nmol min}^{-1}$ )		$0.33\pm 0.08$	$0.14\pm 0.008$
Limit of Detection ( $\text{nmol min}^{-1}$ )	0.31	0.24	0.024
Precision(coefficient of variation)	4.24%		5.61%
Accuracy (an orthogonal fit yielded an equation)	$y=(1.08\pm 0.12)x-(0.02\pm 0.03)$ ( $R^2=0.92$ )	$y=1.08x-0.07$ ( $R^2=0.93$ )	$y=0.97x+0.05$ ( $R^2=0.95$ )

**Figure S2.** DTT activity day segment diagram (a, the entire sampling period (2021.7.9-2021.7.24); b, before it rains (2021.7.9-2021.7.19); c, is raining (2021.7.19-7.20); d, is down after the rain (2021.7.20-7.23))

**Table S2.** Concentrations of Water-Soluble Chemical Species in Ambient PM<sub>2.5</sub> and correlation coefficient (R) of volume normalized species concentrations with DTT<sub>v</sub> respectively for daytime, nighttime.

Parameter	DTT <sub>v</sub>	
	day	night
PM <sub>2.5</sub>	0.018	0.029
SO <sub>2</sub>	<b>0.263**</b>	0.094
NO	-0.067	0.081
NO <sub>2</sub>	-0.11	0.037
NO <sub>x</sub>	-0.106	0.066
CO	<b>0.193*</b>	-0.008
O <sub>3</sub>	<b>0.275**</b>	0.155
BC	-0.129	0.1
NH <sub>4</sub> <sup>+</sup>	<b>0.434**</b>	0.165
K <sup>+</sup>	<b>0.231**</b>	-0.054
Mg <sup>2+</sup>	0.029	-0.036
Ca <sup>2+</sup>	-0.083	0.009
Na <sup>+</sup>	<b>0.351**</b>	-0.106
NO <sub>3</sub> <sup>-</sup>	<b>0.461**</b>	-0.009
SO <sub>4</sub> <sup>2-</sup>	<b>0.351**</b>	0.09
NH <sub>3</sub>	<b>0.231**</b>	0.09

\*P<0.05, \*\*P<0.01.