Supporting information

Photocatalytic Abatement of Ambient NO_x by TiO_2 Coated Solar Panels

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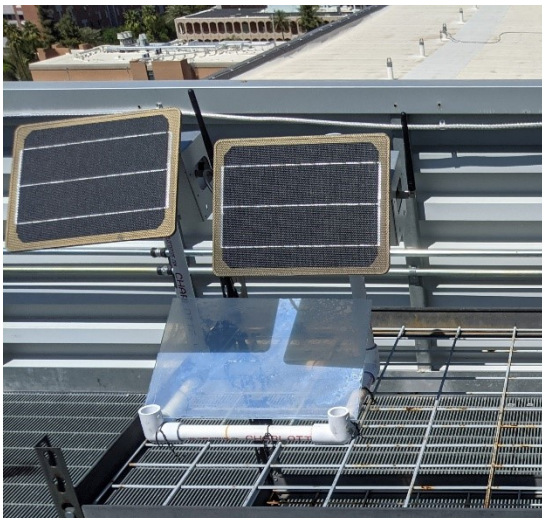
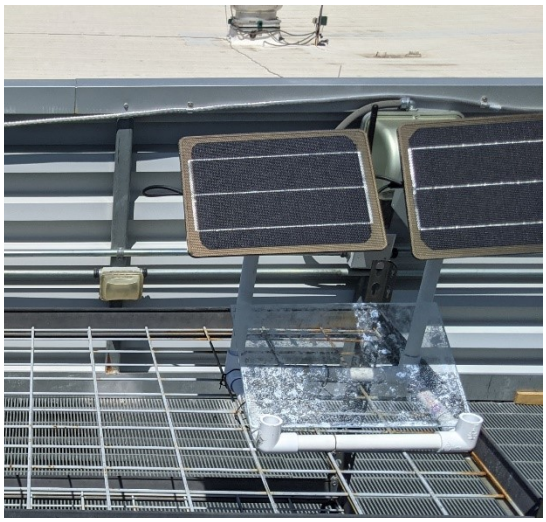
A.

B.





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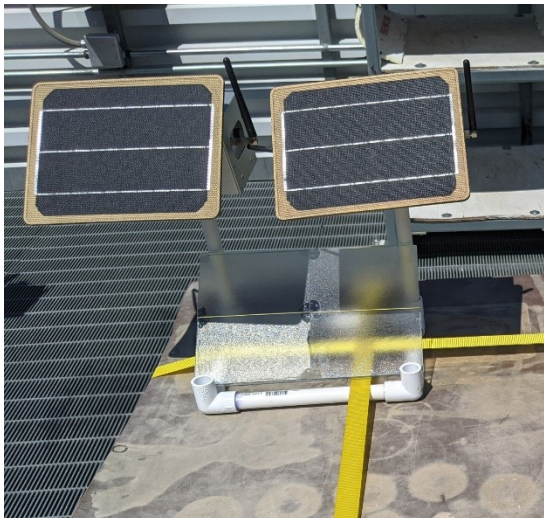

Fig. S1 Image of coated glass panel after 10 days of outdoor exposure. (A) P25 coating (B) FN1 coating (C) Commercial coating

Fig S1 shows the visual assessment of the photocatalyst coatings after outdoor exposure for 10 days without DI water washing. Looking directly at each coating, there does not seem to be a dust buildup on the surfaces from deposition. However, dust was visibly present on the control panel shown in Fig 5, and upon washing each photocatalyst coating with DI water, dust was seen in the wash solution. Additionally, wear and tear of the photocatalyst coating is observed for the FN1 coating, with some of the coating being removed due to outdoor exposure.

Table S1A. Proof of concept testing results. (A) NO, (B) NO_2, and (C) NO_x removal. The data was normalized to the starting NO_x concentration. The testing was done in batches, with measurements taken before and after one hour of UV exposure. A UV-Vis lamp provided the UV radiation. Concentrations are reported as an average of three runs, and the range of measurements is shown as standard deviation.

	FN1				**P25**			
	Before		After		Before		After	
	Average	Stdev	Average	Stdev	Average	Stdev	Average	Stdev
NO	82	9.5	42	18	83	6.9	62	8.5
NO_2	18	9.5	21	7.9	17	7.0	12	1.5
NO_x	100	0	64	16	100	0	75	6.0

Table S1B. Two-tailed equal variance student t-test p values comparing before and after UV exposure during batch NO_x photocatalytic removal experiments

	P25	FN1
NO	***p = .004***	***p < .001***
NO_2	p = .2	p = .09
NO_x	***p < .001***	***p < .001***

Table S2A Results from field testing of the photocatalytic removal of NO_x using TiO_2 coatings from March to June 2021: Average nitrate formed during exposure.

Sample	**mg/m²/day**	**Stdev**
control	**0.89**	**0.46**
Commercial coating	**1.52**	**0.67**
P25 coating	**2.32**	**1.64**
FN1 coating	**8.82**	**10.1**

Table S2B. Two-tailed equal and unequal variance results comparing nitrate formed through NOx photocatalysis for each panel during March to June 2021 field testing.

	Control	Commercial product	P25
Commercial product	***p < .001***		
P25	***p < .001***	***p = .04***	
FN1	***p = .003***	***p = .006***	***p = .01***

Table S3A. Two-tailed equal and unequal variance results comparing nitrate formed though NOx photocatalysis for laboratory controlled photocatalysis and ambient air for the P25, FN1, and commercial product photocatalysts, reported as mol of nitrate/panel/hour. A t-test was not performed for the commercial product results because only one replicate was performed

Photocatalyst	**P value**
P25 indoor: outdoor	***P = .003***
FN1 indoor: outdoor	P = .2
Commercial product indoor: outdoor	N/A

Table S3B. Two-tailed equal and unequal variance results comparing nitrate formed though NOx photocatalysis for laboratory controlled photocatalysis and ambient air for the P25, FN1, and commercial product photocatalysts, reported as mol of nitrate/mol photon. A t-test was not performed for the commercial product results because only one replicate was performed

Photocatalyst	**P value**
P25 indoor: outdoor	***P = .009***
FN1 indoor: outdoor	P = .08
Commercial product indoor: outdoor	N/A

Data to calculate the maximum nitrate that could be formed was acquired by request from the FRM site (Central Phoenix site) provided by the Maricopa County Air Quality Department, which included 1-hour data for NO, NO_2, NO_x, and wind speed. Solar light data was acquired from the Maricopa County Flood Control District using the City of Glendale Solar Radiation sensor (https://alert.fcd.maricopa.gov/showrpts_mc.html). Both data sets covered the range of the field testing from March to June 2021.

Table S4. 2-tailed equal and unequal variance results comparing different photocatalyst coatings and control to the calculated maximum possible nitrate formed through NOx photocatalysis.

Comparison between panels and estimation	P values
Maximum nitrate: Control	***P = <.001***
Maximum nitrate: Commercial product	***P = <.001***
Maximum nitrate: P25	***P = <.001***
Maximum nitrate: FN1	***P = <.001***