

Electronic Supplementary Information

for

Translocation and physiological impact of titanium dioxide and zinc oxide nanoparticles on the tomato (*Solanum lycopersicum* L.)

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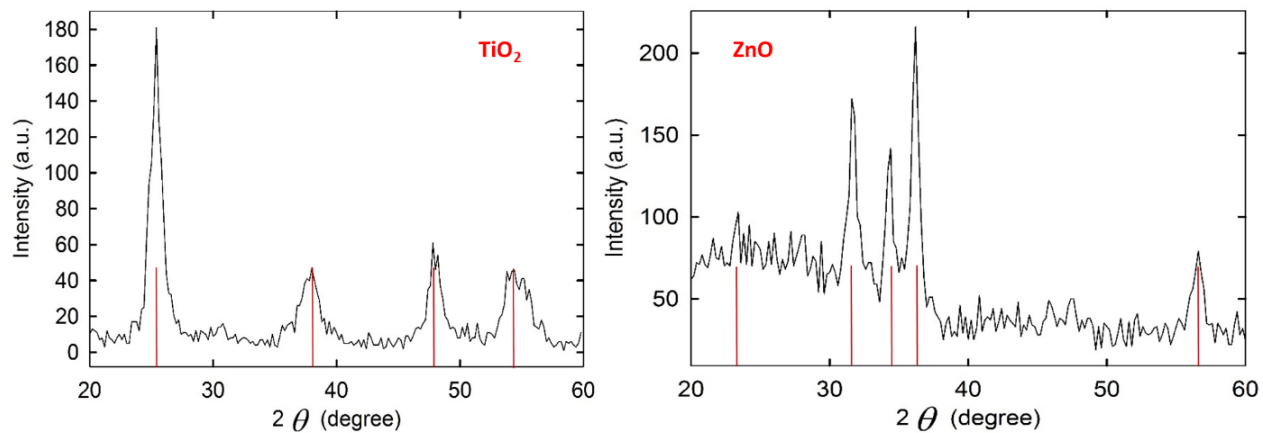
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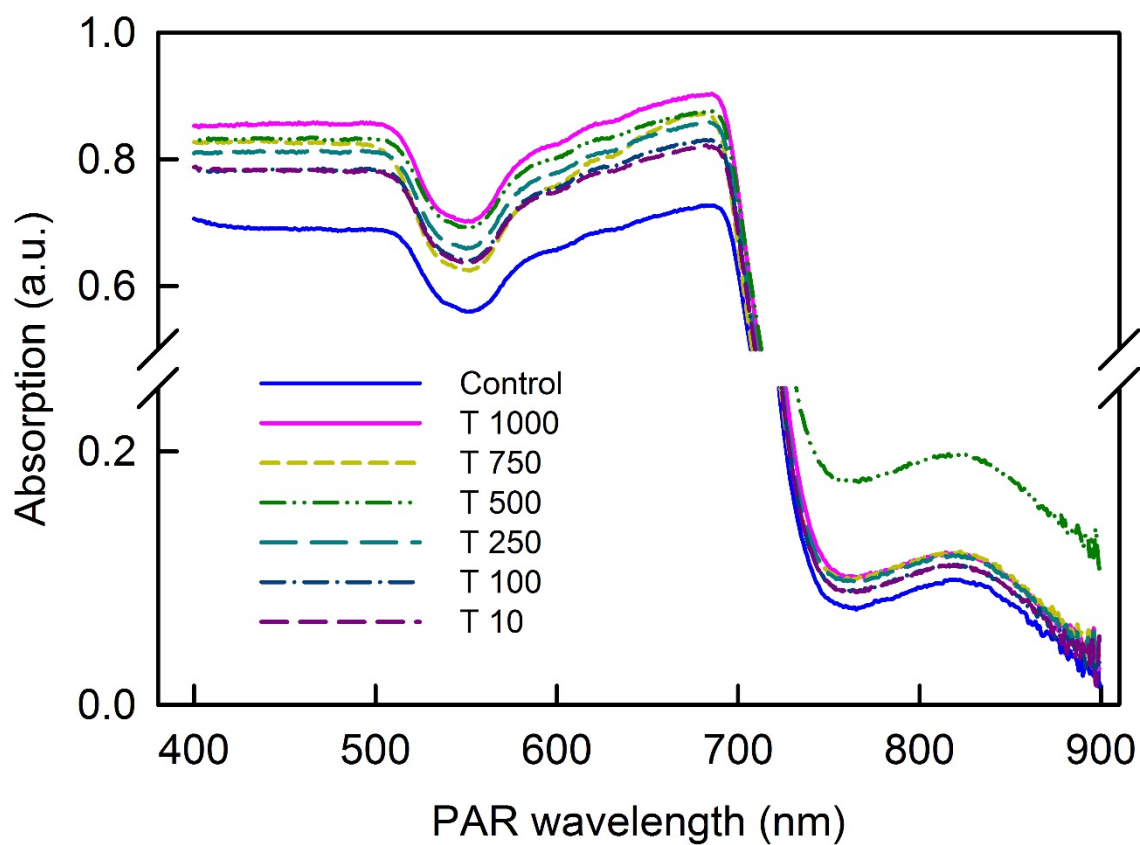
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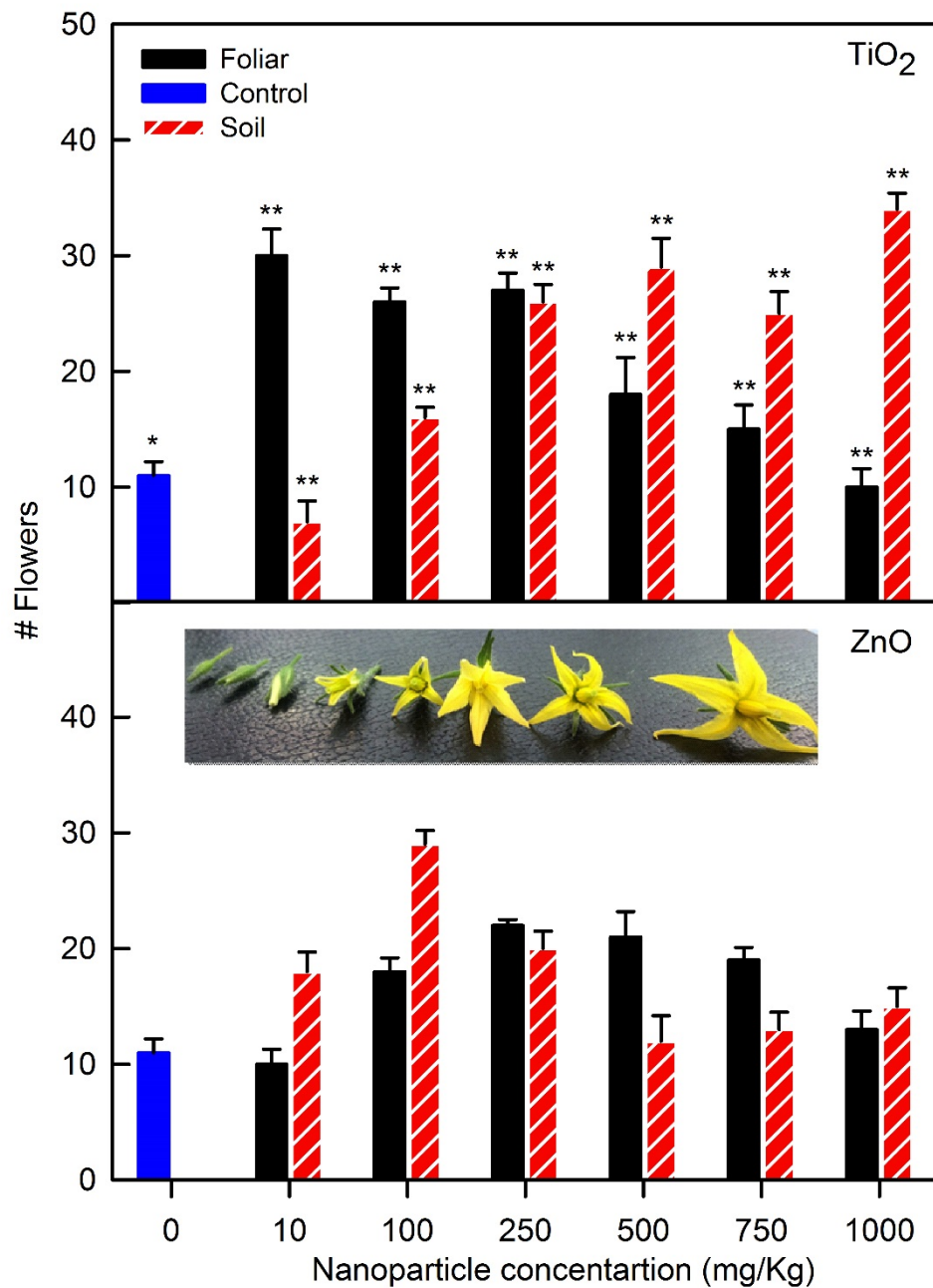
Email: pbiswas@wustl.edu (Biswas)



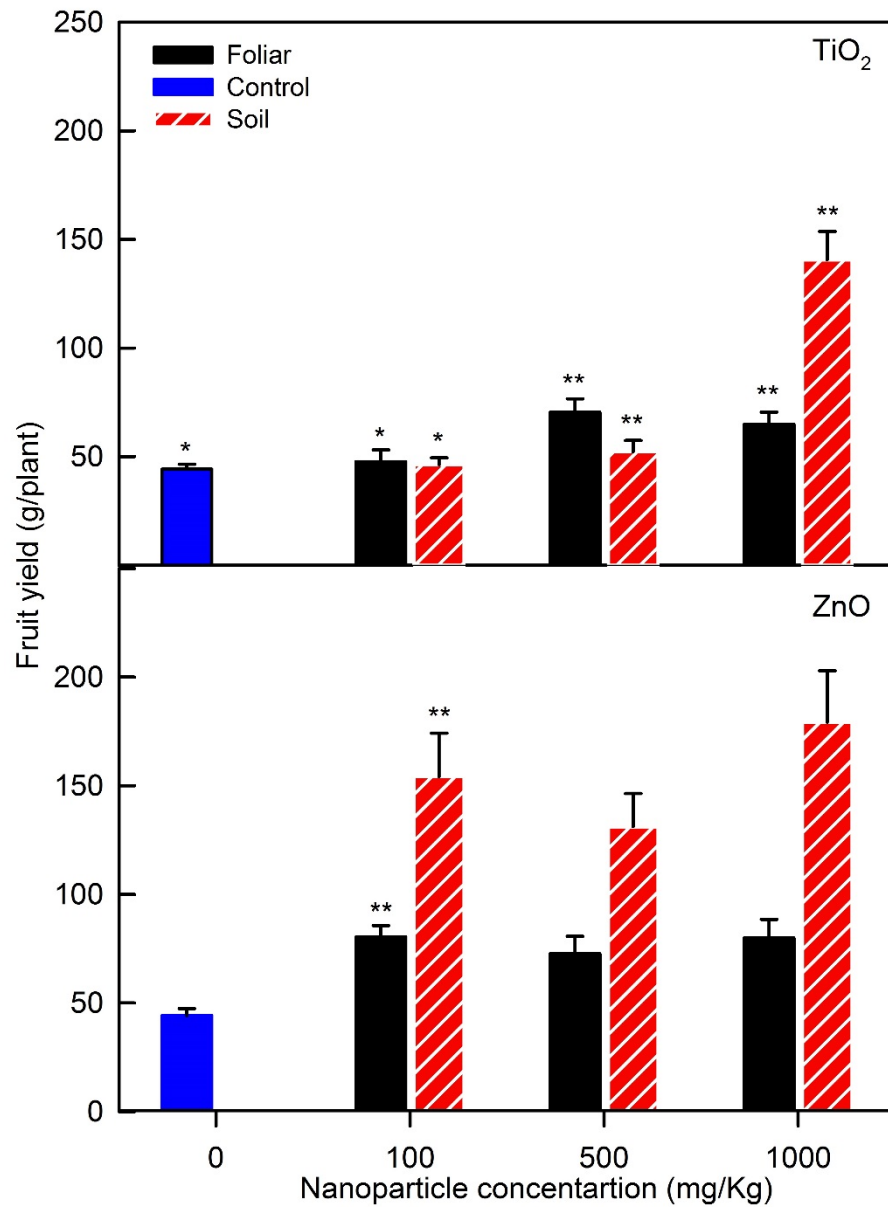
Supplementary Fig. S1. XRD characterization of TiO_2 and ZnO nanoparticles.



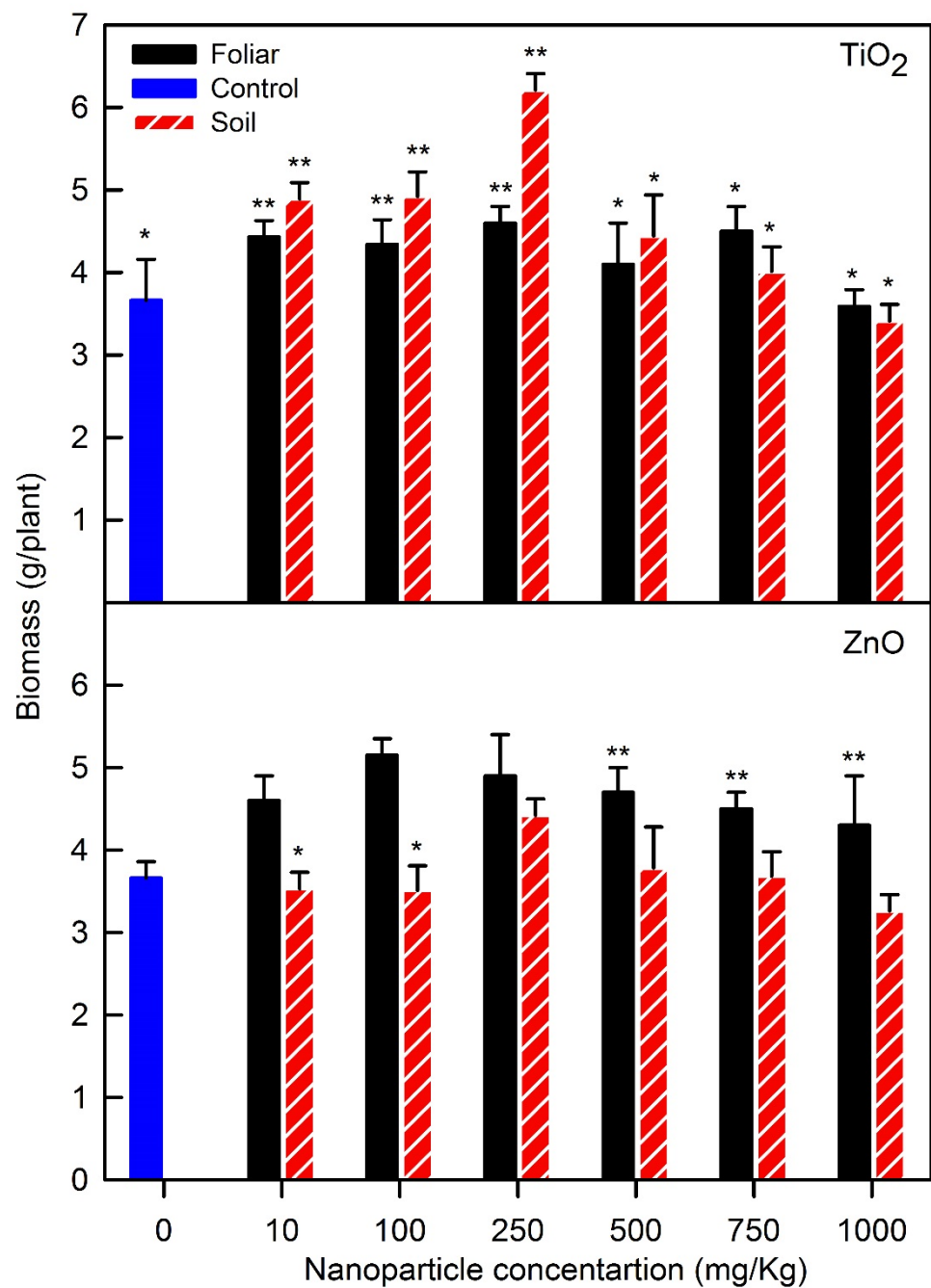
Supplementary Fig. S2. PAR absorption by TiO₂ NPs treated tomato leaf. The letter T stands for TiO₂, and a numeric value with the letter T describes the concentration of TiO₂ NPs in mg/Kg.



Supplementary Fig. S3. Effect of TiO₂ and ZnO nanoparticles on flower appearance at growth stage on the 40th day after germination. (*Inset of the figure shows the typical anthesis of tomato flowers*). Error bar represents the standard deviation. $n = 4$. Asterisk(s) above bar demonstrate significant difference ($p < 0.05$).



Supplementary Fig. S4. Effect of TiO_2 and ZnO nanoparticles on tomato fruit yield on the 66th day. Error bar represents the standard deviation. $n = 4$. Asterisk(s) above bar demonstrate significant difference ($p < 0.05$).



Supplementary Fig. S5. Effect of TiO₂ and ZnO nanoparticles on dry biomass at the 28th day.

Error bar represents the standard deviation. $n = 4$. Asterisk(s) above bar demonstrate significant difference ($p < 0.05$).

Supplementary Table S1: Tomato plant growth stage and phenological analyses.

Growth stage	Description	Day	Control	TiO ₂ ^a nanoparticle	ZnO ^a nanoparticles
Surface sterilized dry seeds	Radical emergence	3	+, Yes	+	+
	Cotyledon development	5	+	+	+
Foliage development	1 st leaf on the main stem	8	+	+	+
	2—3 rd leaves on the main stem	12	+	+	+
Stem development	Plant height (cm) at critical growth stage	28	43.43 ^b ± 1.2 ^c	52.89 ± 1.8	50.79 ± 2.4
Flower development	1 st flower	28	—, No	+	+
	development	32	+		
Fruit development	1 st fruit	43	—	+	+
	appearance (green color)	48	+		
	1 st fruit turns to the mature color	52	—	+	+
	Fruit harvest	66	+	+	+

^a Observation at 250 mg/kg treatment of nanoparticles, independent to delivery approach^b Average value of three replicate; ^c standard deviation