

## Supporting Information

### **Molecular mechanisms of maize seedling response to La<sub>2</sub>O<sub>3</sub> NPs exposure: Water uptake, aquaporin gene expression and signal transduction**

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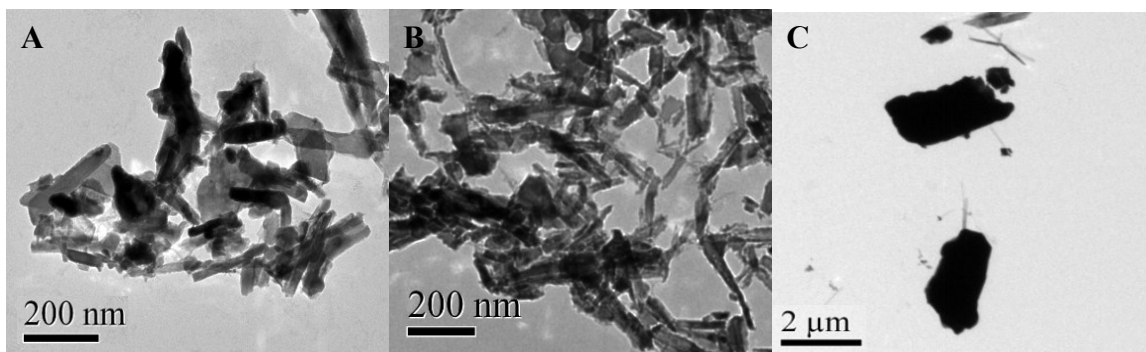
**Numbers of Pages: 8**

**Numbers of Figures: 5**

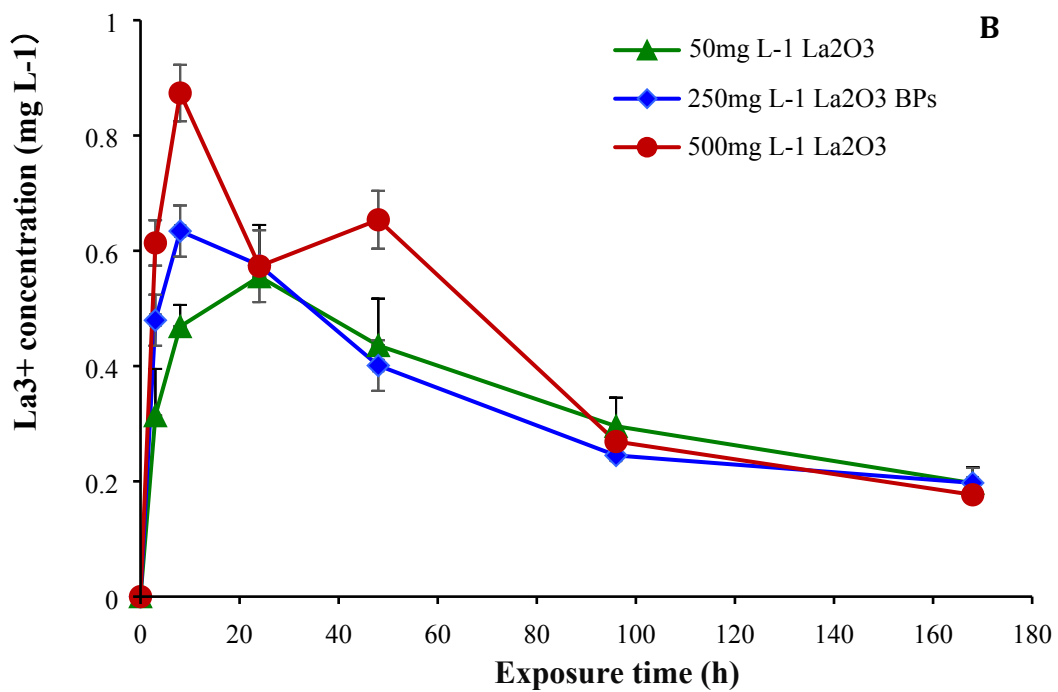
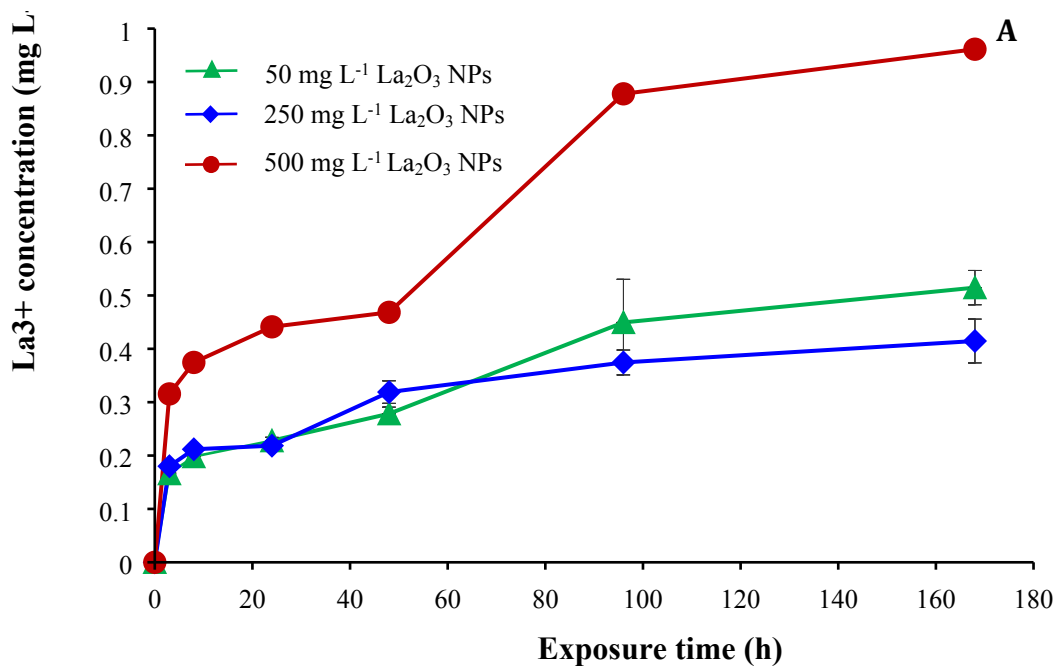
**Numbers of Tables: 2**

**Table S1.** Average hydrodynamic particle diameters (dh) and zeta potentials ( $\zeta$ ) of La<sub>2</sub>O<sub>3</sub> NPs and La<sub>2</sub>O<sub>3</sub> BPs in different conditions.

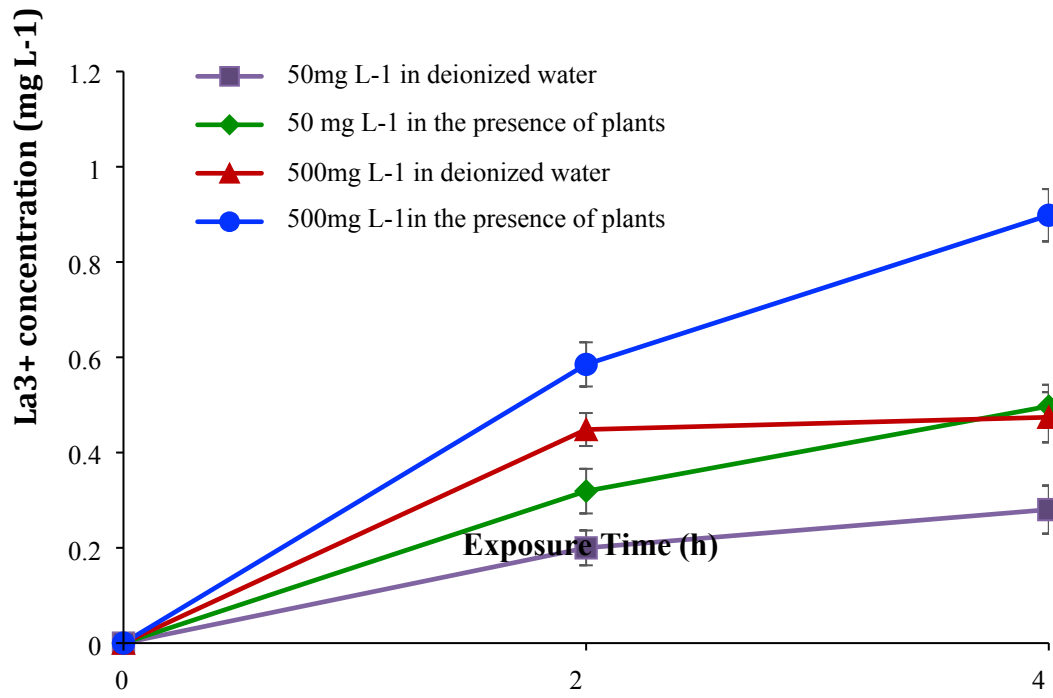
	Deionized water for 0 h		Deionized water for 48 h	
	La <sub>2</sub> O <sub>3</sub> NPs	La <sub>2</sub> O <sub>3</sub> BPs	La <sub>2</sub> O <sub>3</sub> NPs	La <sub>2</sub> O <sub>3</sub> NPs in presence of plants
SIZE (nm)	744±68	1800±137	1252±265	1503±190
Zeta potential (mV)	6.68±0.77	-19.57±0.83	20.50±0.87	16.97±1.85



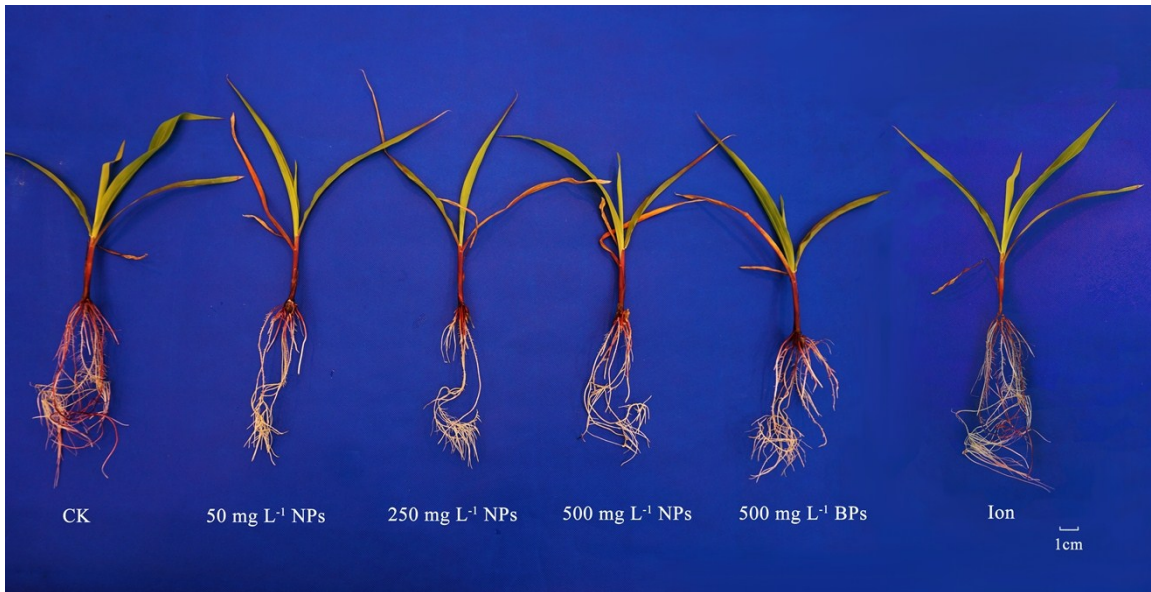
**Figure S1.** TEM image of  $\text{La}_2\text{O}_3$ NPs and  $\text{La}_2\text{O}_3$ BPs: A.  $\text{La}_2\text{O}_3$  NPs in deionized water; B.  $\text{La}_2\text{O}_3$  NPs in deionized water in the presence of plants for 48 h; C.  $\text{La}_2\text{O}_3$  BPs in deionized water.



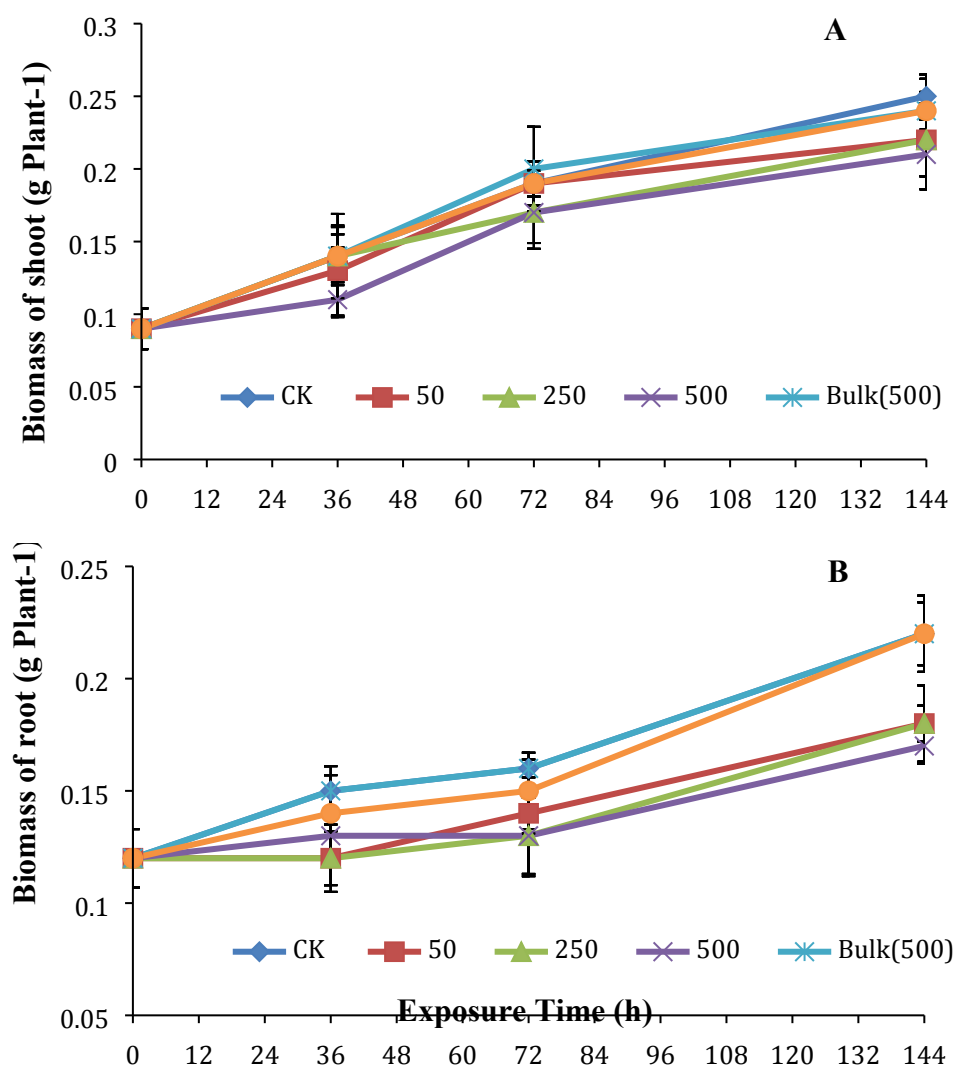
**Figure S2.** Time-dependent dissolution of 50, 250 and 500mg L<sup>-1</sup> La<sub>2</sub>O<sub>3</sub> NPs (A) and La<sub>2</sub>O<sub>3</sub> BPs (B) in deionized water.



**Figure S3.** Time-dependent dissolution of 50 and 500mg L<sup>-1</sup> La<sub>2</sub>O<sub>3</sub> NPs in deionized water with or without the presence of plants.



**Figure S4.** Photos of maize seedlings in the presence of control, 50 mg L<sup>-1</sup>, 250 mg L<sup>-1</sup>, 500 mg L<sup>-1</sup> La<sub>2</sub>O<sub>3</sub> NPs, 500 mg L<sup>-1</sup> BPs and ion treatments.



**Figure S5.** Effects of control (CK), 50 mg L<sup>-1</sup>, 250 mg L<sup>-1</sup>, 500 mg L<sup>-1</sup> La<sub>2</sub>O<sub>3</sub> NPs, 500 mg L<sup>-1</sup> bulk particles and ion treatments on shoot dry biomass (A) and root dry biomass (B).

**Table S2.** Primers used for gene expression in maize under La<sub>2</sub>O<sub>3</sub> NPs treatment

Accession No.	Gene	Definition	Primers (5'-3')
AY243800.1	<i>zmPIP1;1</i>	Zea mays plasma membrane intrinsic protein (PIP1;1) mRNA, complete cds.	F:cccctactatgttacgtggagttc R:gccggcatattacacaattggta
AF131201.1	<i>zmPIP1;2</i>	Zea mays plasma membrane MIP protein (pip1;2) mRNA, complete cds.	F:gctcaaacagacaaggactac R:caagatgatgatgatgactcgaaag
AF326494.1	<i>zmPIP2;4</i>	Zea mays plasma membrane integral protein ZmPIP2;4 mRNA, complete cds.	F:taccggagcaacgcctaag R:gaaaacagcagcgagcga
AF130975.1	<i>zmPIP2;5</i>	Zea mays plasma membrane intrinsic protein (pip2;5) mRNA, complete cds.	F:tgtcgtcgttggttgct R:cacaacaatcacactagcttgaa
AF037061.1	<i>zmTIP1;1</i>	Zea mays tonoplast intrinsic protein (ZmTIP1) mRNA, complete cds.	F:gctcgccgccgttagtttct R:gacgactgctggtccaaggaag
AF326483.1	<i>zmNIP1;1</i>	Zea mays NOD26-like membrane integral protein ZmNIP1;1 mRNA, complete cds.	F:ggatctacggcagcgacaagga R:aatggcggaacacggcgaac
NM_001174192.2	<i>zmTubulin</i>	Zea mays tubulin alpha-3 chain (LOC100381303), mRNA.	F:acatctgccgccgtccctt R:gcgctgttggtgatttcg
X07157.1	<i>zmGAPDH</i>	Maize cytosolic mRNA for subunit A of chloroplast GAPDH (GapA) glyceraldehyde-3-phosphate dehydrogenase.	F:agcaggtcgagcatcttcg R:ctgtagccccactcgtgtgc