

Supporting Information

Alleviation of Nitrogen Stress in Rice (*Oryza sativa*) by Cerium Nanoparticles

Yaoyao Wang^{1,#}, *Peng Zhang*^{2,,#,*}, *Mingshu Li*¹, *Zhiling Guo*², *Sami Ullah*², *Yukui Rui*^{1,*},
*Iseult Lynch*²

¹Beijing Key Laboratory of Farmland Soil Pollution Prevention and Remediation, College of Resources and Environmental Sciences, China Agricultural University, Beijing 100193, China

²School of Geography, Earth and Environmental Sciences, University of Birmingham, Edgbaston, B15 2TT Birmingham, United Kingdom

The two authors contributed equally.

Corresponding authors: p.zhang.1@bham.ac.uk (P.Z.); ruiyukui@163.com (Y. R.)

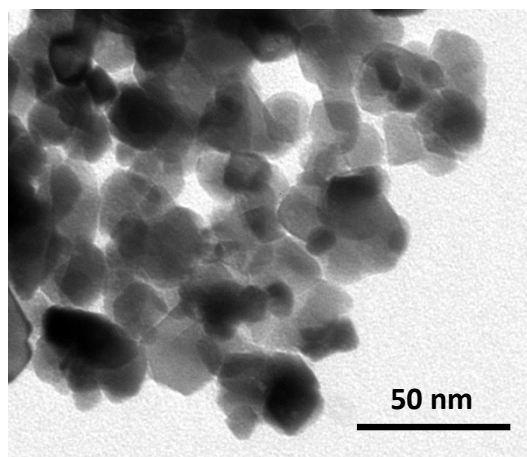


Figure S1. TEM images of CeO₂ NPs. The primary size obtained from the image is 23.5 ± 6.7 nm.

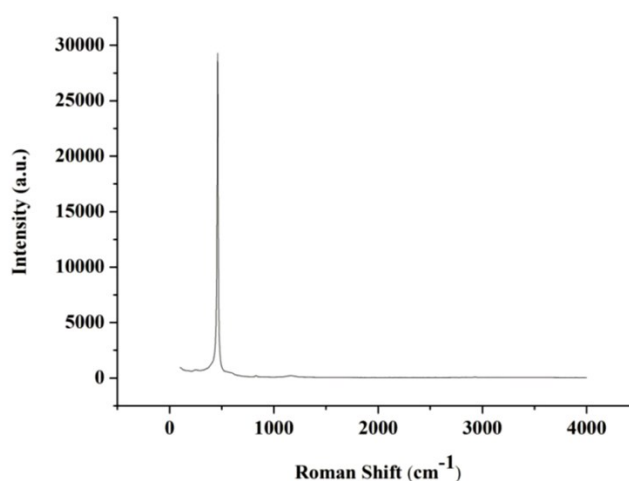


Figure S2. Raman spectra of CeO₂ NPs. The Raman shift at 465 cm^{-1} is assigned to the F2g band from Fm $\bar{3}m$ group of a cubic fluorite structure.

Table S1. Zeta potential and hydrodynamic size of CeO₂ NPs (100 mg/L) in deionized water and nutrient solution. The lowercase letters were used to show the significant difference ($p < 0.05$).

CeO ₂ suspension	Zeta potential (mV)	Diameter (nm)
in nutrient solution	-14.7 ± 1.2^a	559 ± 45^a
in deionized water	-12.3 ± 1.7^a	520 ± 39^a