

## **Effect of Cerium Oxide Nanoparticles on Asparagus Lettuce Cultured in Agar Medium**

Di Cui <sup>a,b</sup>, Peng Zhang<sup>b</sup>, Yuhui Ma<sup>b</sup>, Xiao He<sup>b</sup>, Yuanyuan Li<sup>b</sup>, Jing Zhang<sup>c</sup>, Yuechun Zhao<sup>\*a</sup>, Zhiyong Zhang<sup>\*b</sup>

<sup>a</sup>Department of Applied Chemistry, College of Science, South China Agricultural University, Guangzhou 510642, China. E-mail: [yczhao@scau.edu.cn](mailto:yczhao@scau.edu.cn)

<sup>b</sup>Key Laboratory for Biological Effects of Nanomaterials and Nanosafety, Key Laboratory of Nuclear Radiation and Nuclear Energy Technology, Institute of High Energy Physics, Chinese Academy of Sciences, Beijing 100049, China. E-mail: [zhangzhy@ihep.ac.cn](mailto:zhangzhy@ihep.ac.cn)

<sup>c</sup>Beijing Synchrotron Radiation Facility, Institute of High Energy Physics, Chinese Academy of Sciences, Beijing 100049, China

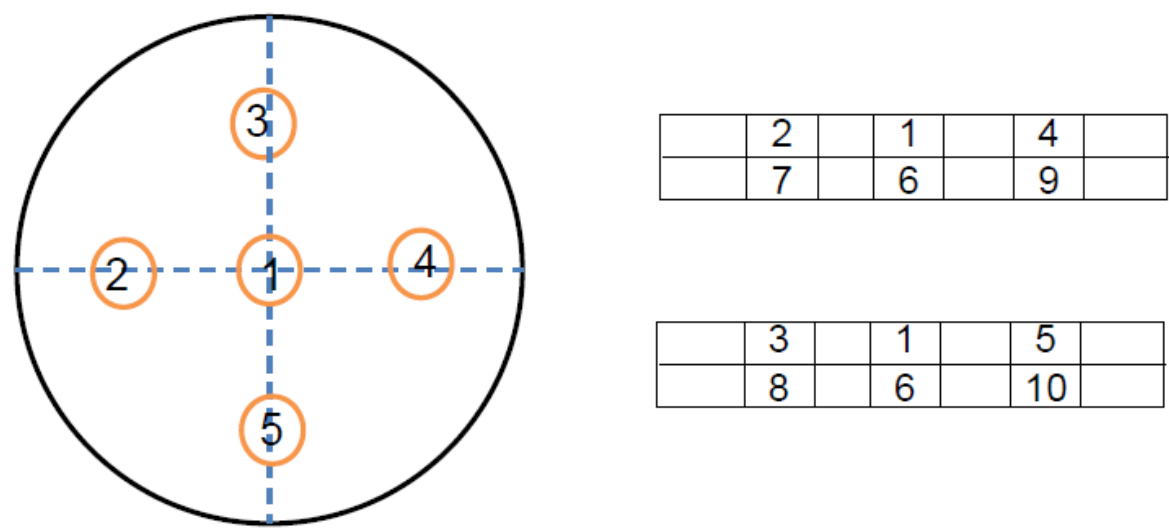


Figure S1. Ten agar samples were taken from 5 different points of the agar medium containing 200 mg/L CeO<sub>2</sub> in a Petri dish. Five from upper parts (1, 2, 3, 4, and 5) and 5 from lower parts (6, 7, 8, 9, and 10).

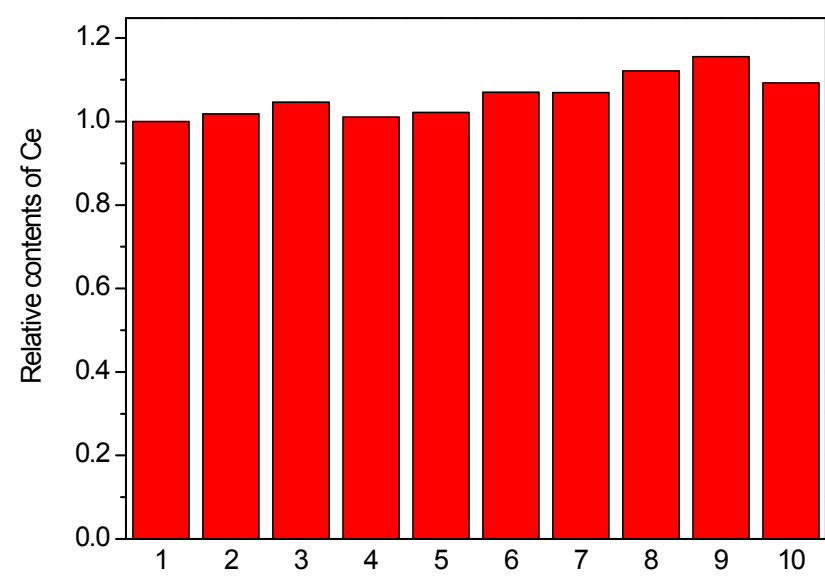


Figure S2. Relative Ce contents of in the agar samples. The content of Ce in sample 1 was set as 1.

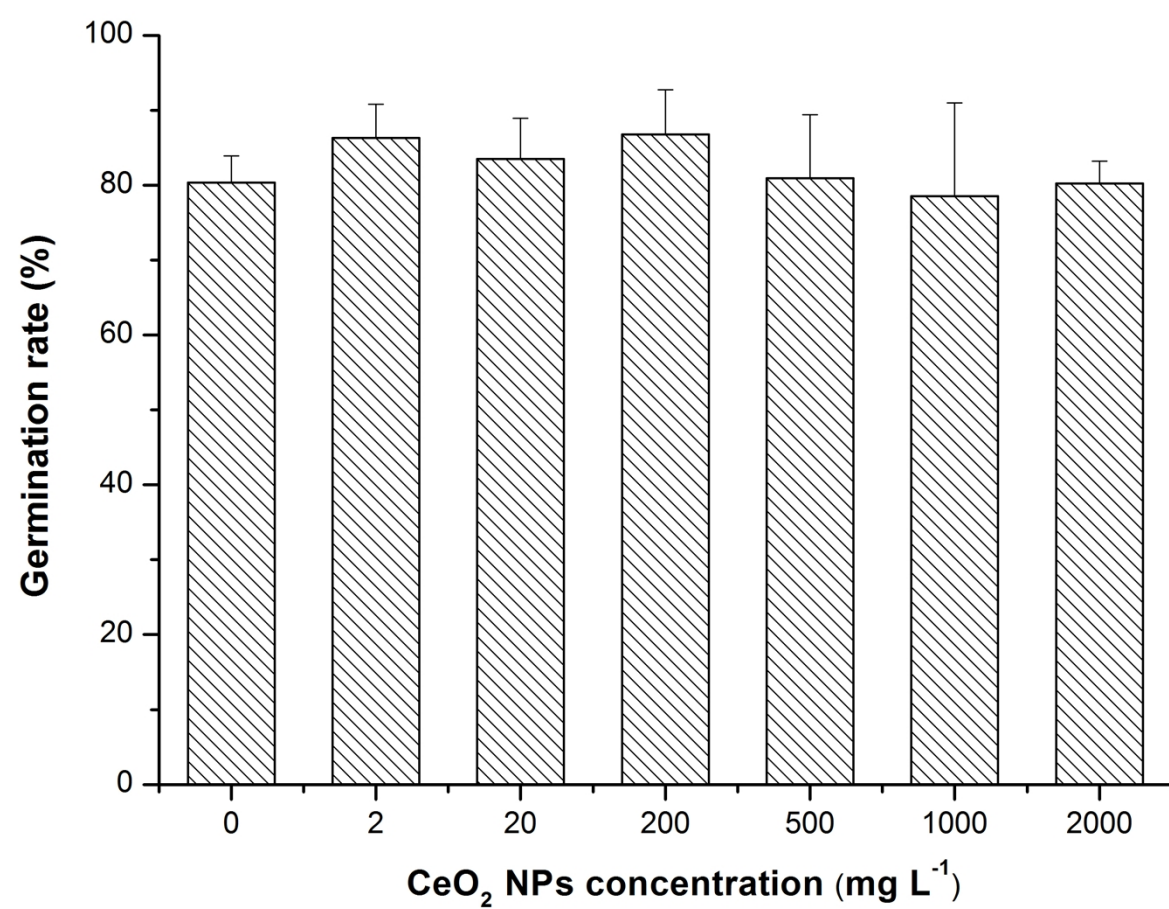


Figure S3. Effects of CeO<sub>2</sub> NPs on seed germination of asparagus lettuce. The means are averaged from 4 replicates with 14 seeds. The values were given as mean  $\pm$  SD (standard deviation).

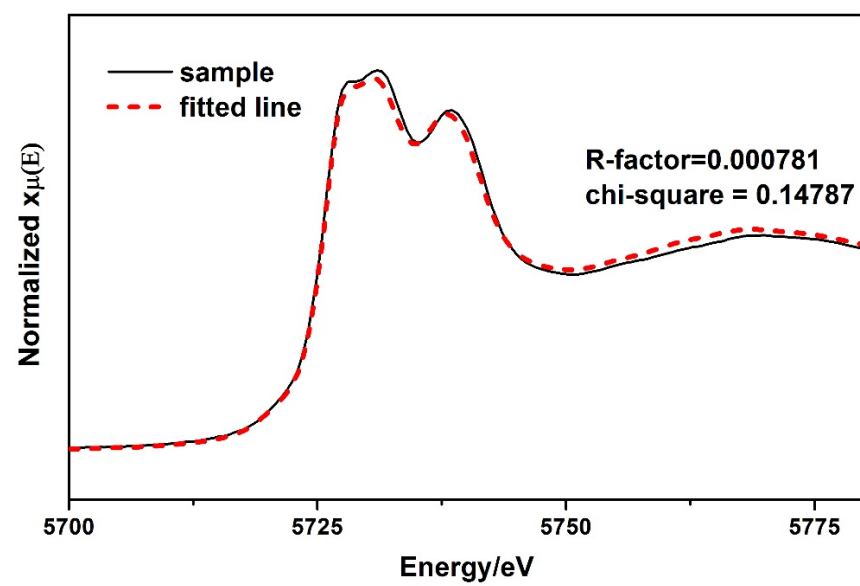


Figure S4. LCF results of XANES Ce L<sub>III</sub>-edge normalized spectra in lettuce roots. Red dash line indicated the LCF fitted line of spectra of samples.

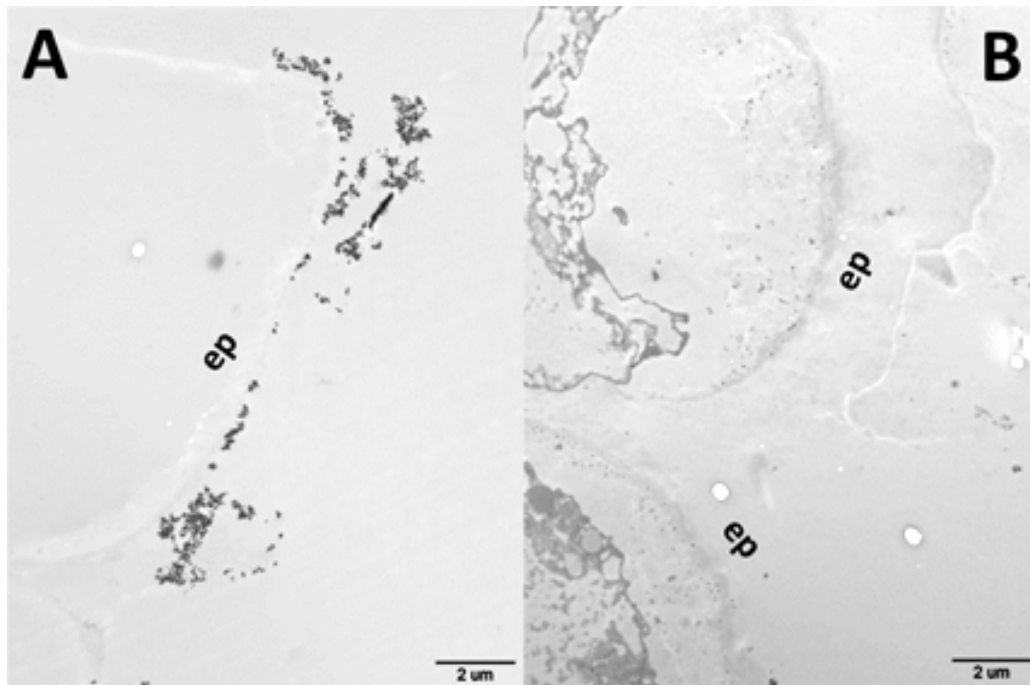


Figure S5 . TEM images of lettuce roots treated with CeO<sub>2</sub> NPs in water (A) and agar medium (B)for 5 days. ep: epidermis.

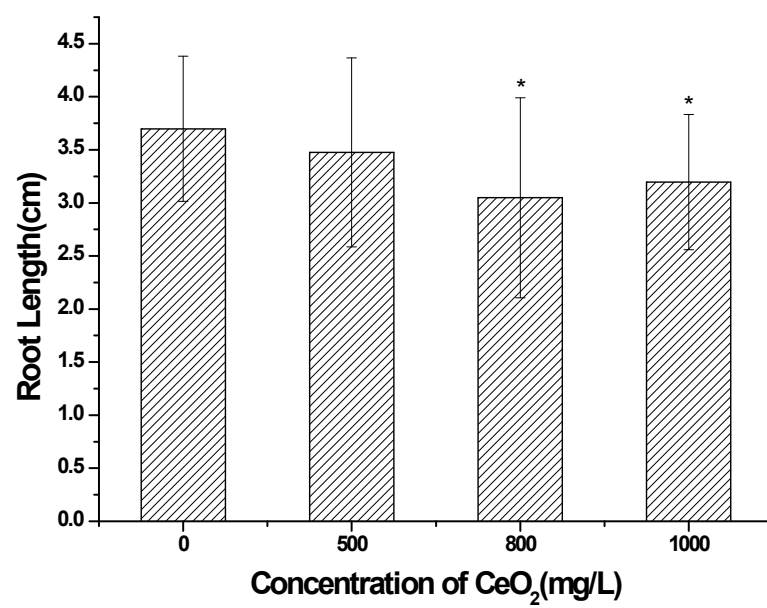


Figure S6. Root length of asparagus lettuce cultured in deionized water amended with different concentrations of CeO<sub>2</sub> NPs for 5 days. The means are averaged from 4 replicates of *Asparagus* lettuce. The values were given as mean ± SD (standard deviation). Significant differences versus control were marked with “\*” (p < 0.05).