Electronic Supplementary Material (ESI) for Environmental Science: Nano.

Electronic Supplemental Information

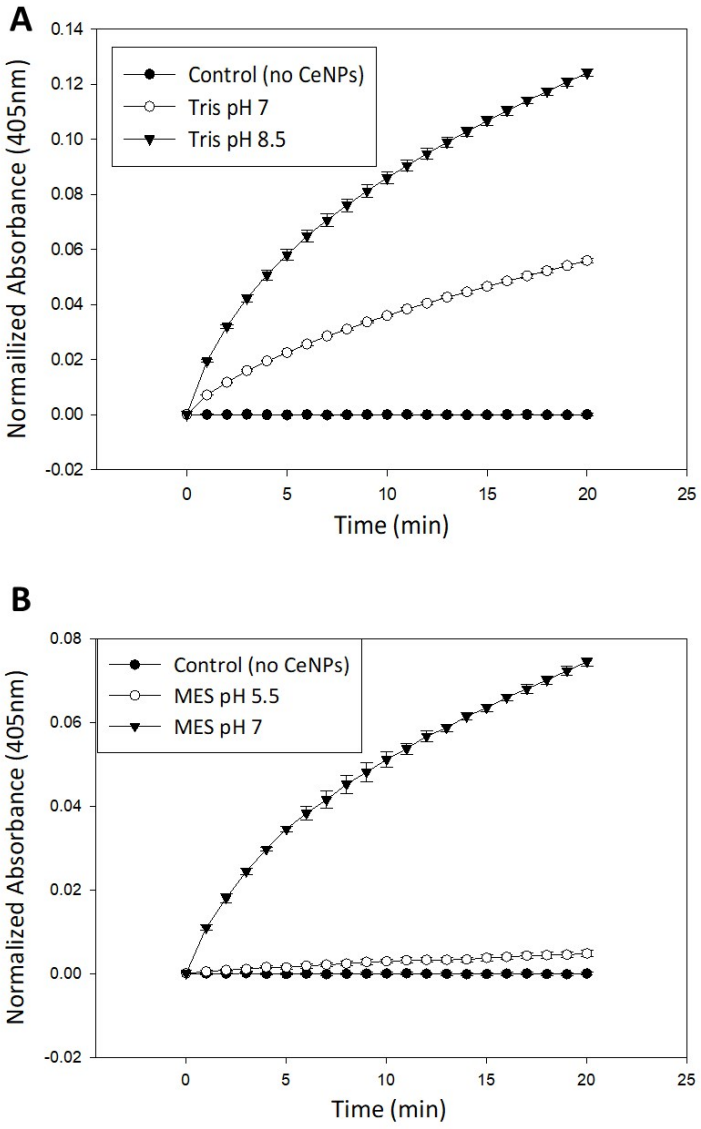

Figure S1: Dependence of phosphatase activity on pH of Tris and MES buffers. Using the pNPP assay with [CeNPs] = 25 µM and [pNPP] = 1.2mM. (A) Phosphatase activity increases with increase in pH at 25 °C - Tris was used as a buffer. (B) Phosphatase activity increases with increase in pH at 25 °C - MES was used as a buffer.

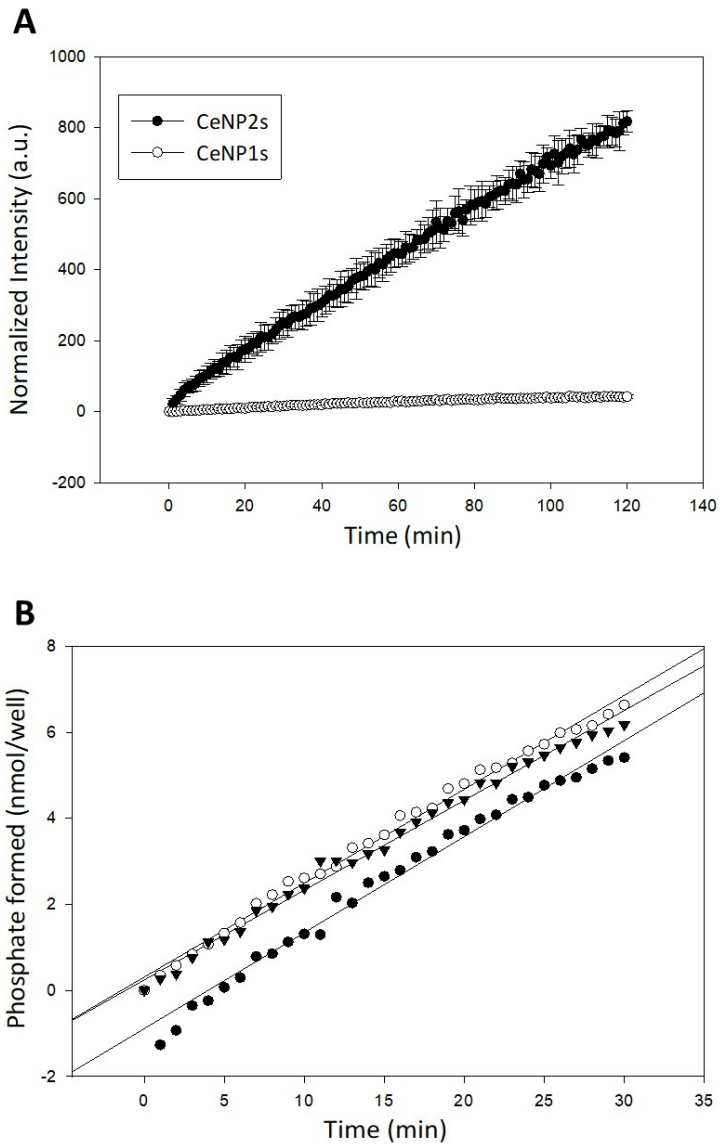

Figure S2: Confirmation of phosphatase activity by the MUP and EnzChek® assay. (A) Phosphatase activity demonstrated in the MUP assay with [MUP] = 1mM and [CeNPs] = 200 µM. (B) Phosphatase activity of CeNP2s demonstrated in the EnzChek® assay with [ATP] = 100 µM and [CeNPs] = 200 µM. The triplicates are represented by separate symbols.

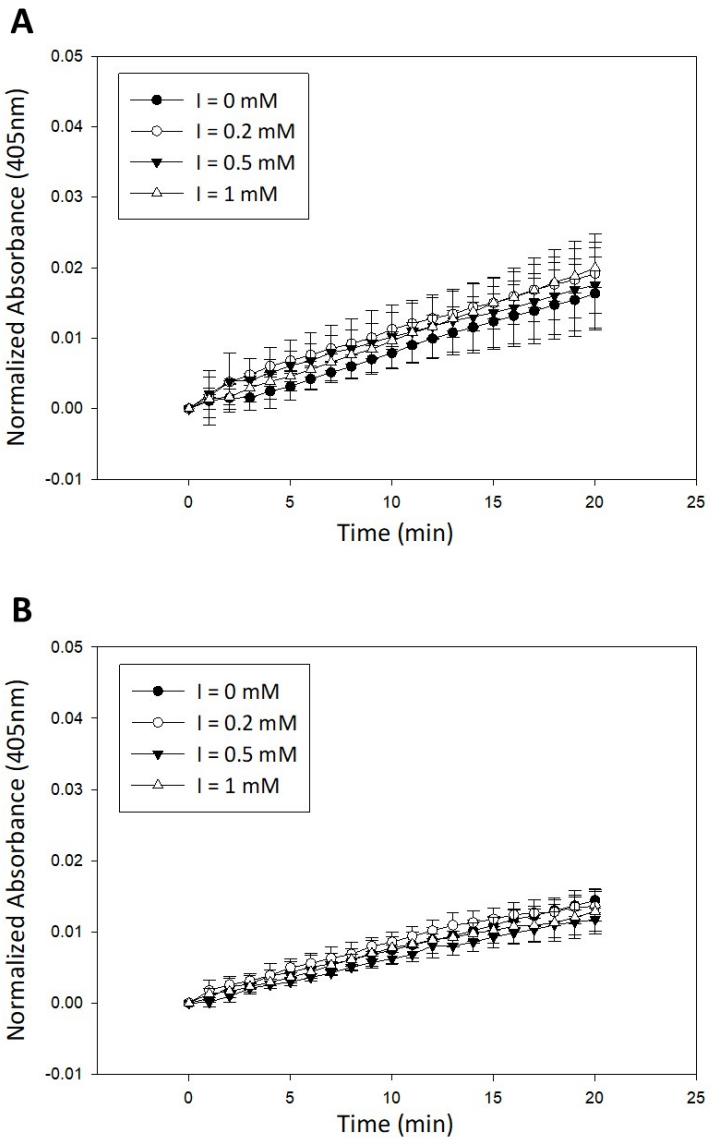

Figure S3: Sulfate and Selenate do not inhibit phosphatase activity. Using the pNPP assay with [CeNPs] = 100 µM and [pNPP] = 1.2 mM. (A) Sulfate does not inhibit phosphatase activity; [sulfate] = 0, 0.2, 0.5 and 1 mM. B) The same result was obtained for selenate; [selenate] = 0, 0.2, 0.5 and 1 mM.

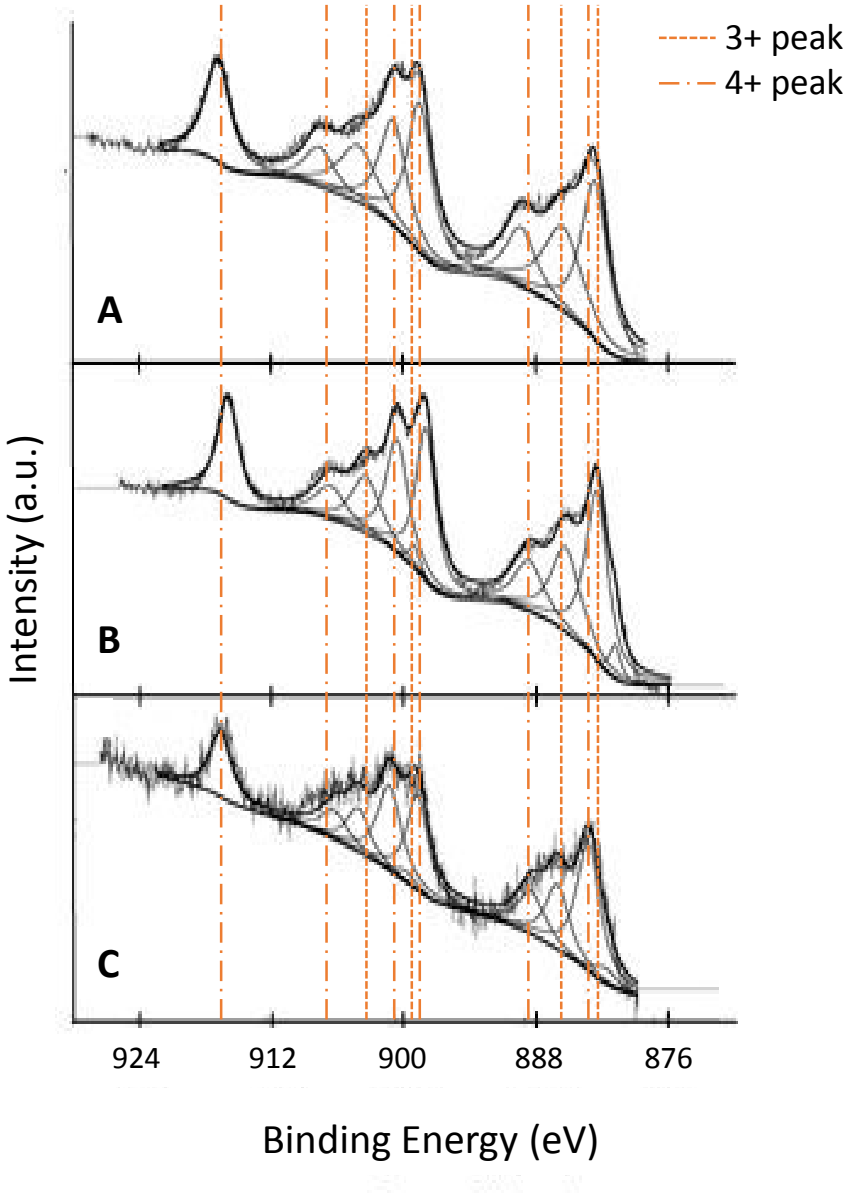

Figure S4: Inhibitors do not change the oxidation state of cerium in CeNPs. XPS spectra of CeNP2s after incubation with tungstate and molybdate. Peaks around 881, 886, 899 and 903 eV correspond to cerium in the 3+ state. Peaks around 882, 889, 898, 901, 907 and 916 eV correspond to cerium in the 4+ state. The peak around 916 eV is a distinguishing characteristic of a sample with a low 3+/4+ ratio. (A) Deconvoluted spectrum for CeNP2s alone (control). (B) Spectra after incubation with tungstate. Tungstate does not significantly alter the state of CeNPs. (C) Spectra after incubation with molybdate. Molybdate also does not significantly alter the state of CeNPs.