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Supporting Information for:

Defect chemistry and vacancy concentration of luminescent europium doped ceria nanoparticles by solvothermal method

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Total external reflection X-ray fluorescence (TXRF): TXRF was used to confirm the metal cation ratio of the synthesised powdered ceria.

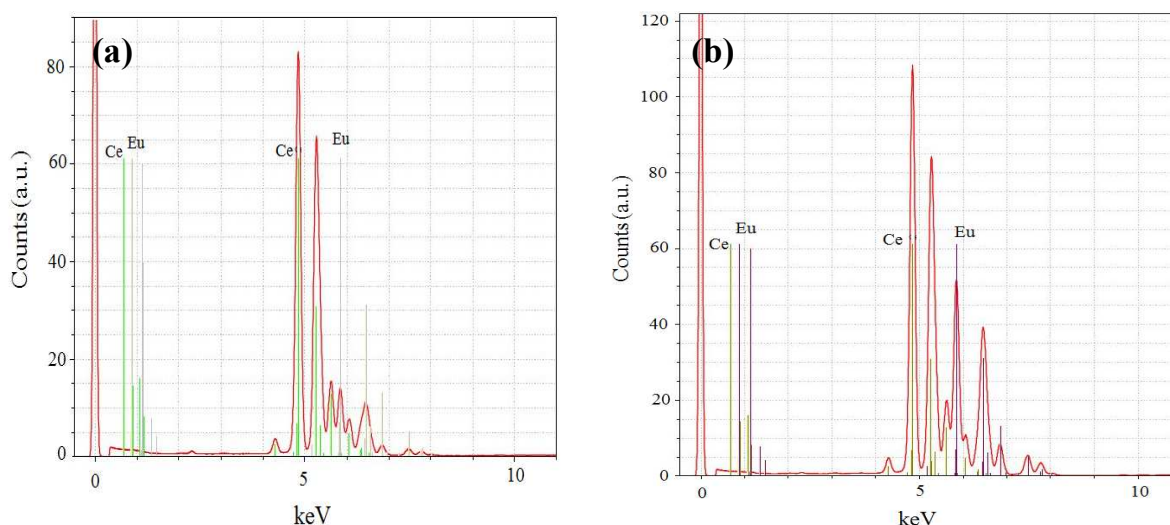


Figure S-1. Typical TXRF graphs of europium doped ceria nanoparticles showing line positions. (a) CEEU7.6 (b) CEEU19.6

Particle size distribution of undoped and doped ceria nanoparticles:

Figure S-2 shows the particle size distribution for the undoped, 0.8 % and 13.9 % Eu doped ceria samples calculated from TEM images. The plot shows ± 0.4 nm disparity in the particles sizes.

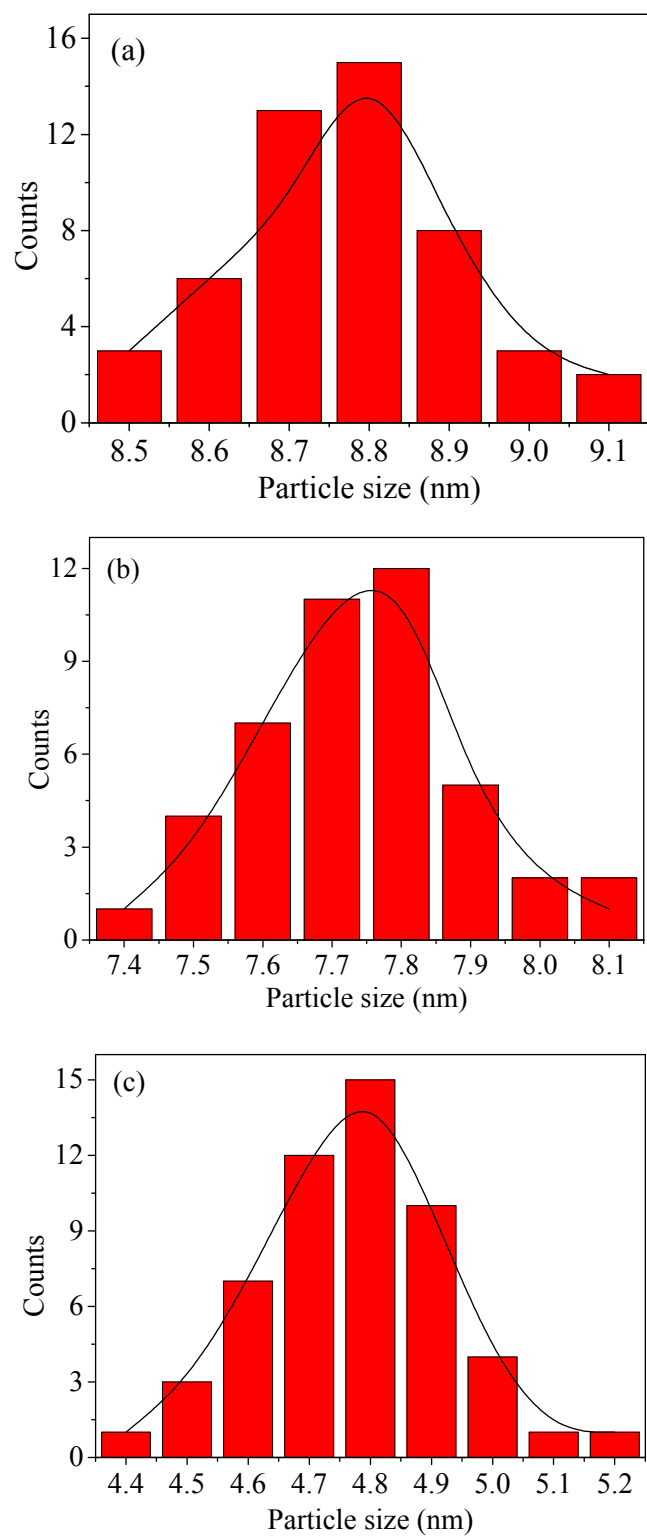


Figure S-2. Particle size distribution of (a) undoped (b) 0.8 % Eu doped (c) 13.9 % Eu doped ceria samples.

EDAX mapping by STEM:

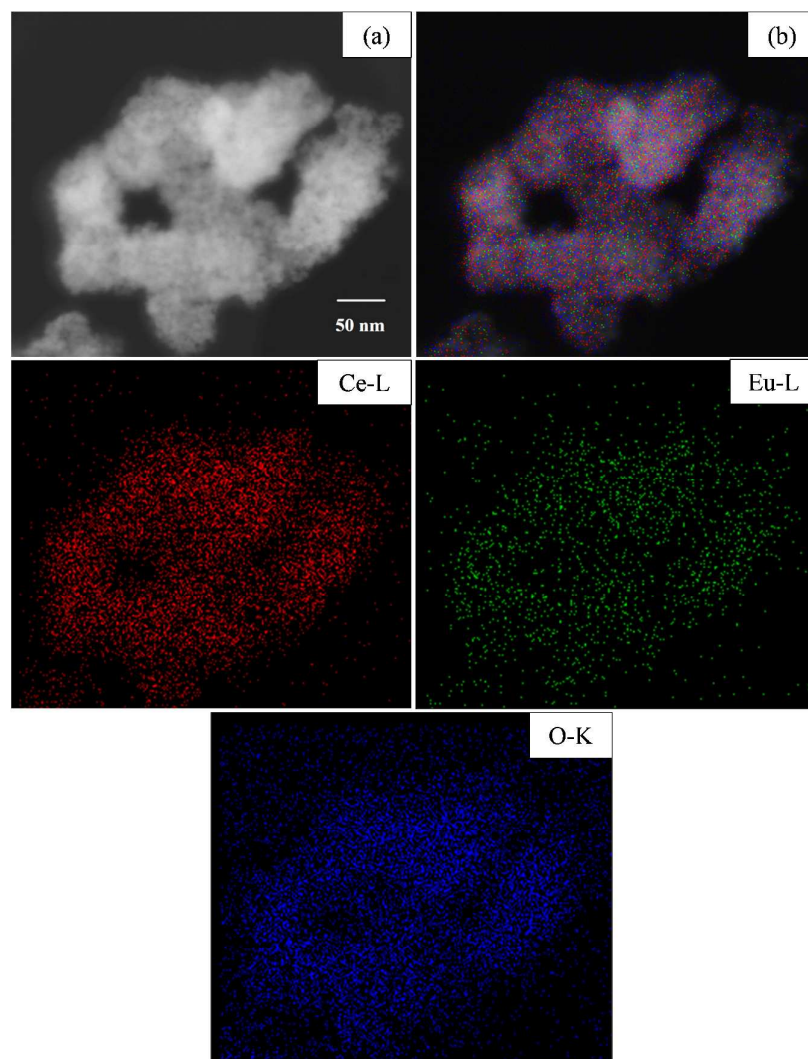


Figure S-3. Ce-L, Eu-L, O-K mapping of ceria cluster of CEEU7.6 by STEM. (a) aberration-corrected STEM image of ceria cluster (b) superimposed display of the elemental mapping on ceria cluster.

The large scale mapping on ceria samples was taken by scanning transmission electron microscopy (STEM) to demonstrate the distribution of doped Europium in ceria nanoparticles. Figure S-3 shows the aberration-corrected STEM image, Ce-L, Eu-L, O-K elemental mapping of ceria cluster of CEEU7.6 sample. The elemental maps exhibit the

presence of Eu, Ce and O throughout the cluster. This result indicates that the europium is uniformly distributed in ceria and not present as a free species within the powdered sample.