

Supplementary information for

“Synthesis, structure, EPR studies and up-conversion luminescence of ZnO:Er³⁺-Yb³⁺@Gd₂O₃ nanostructures” by Nataliya Babayevska, Barbara Peplińska, Marcin Jarek, Luis Yate, Krzysztof Tadyszak, Jacek Gapiński, I. Iatsunskiy and Stefan Jurga.

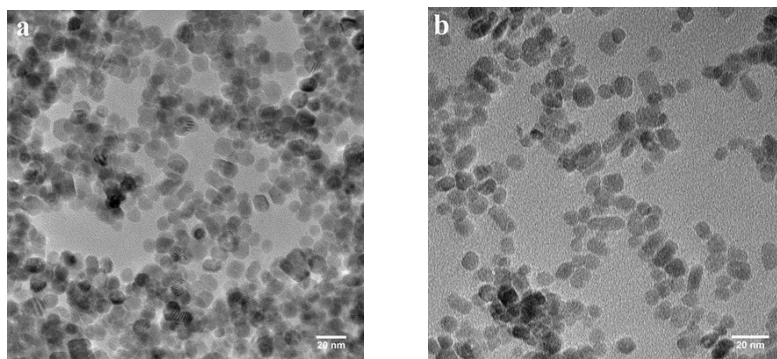


Fig. S1 HRTEM images of the as-obtained un-doped ZnO NPs (a) and ZnO:Er³⁺-Yb³⁺ NPs (b).

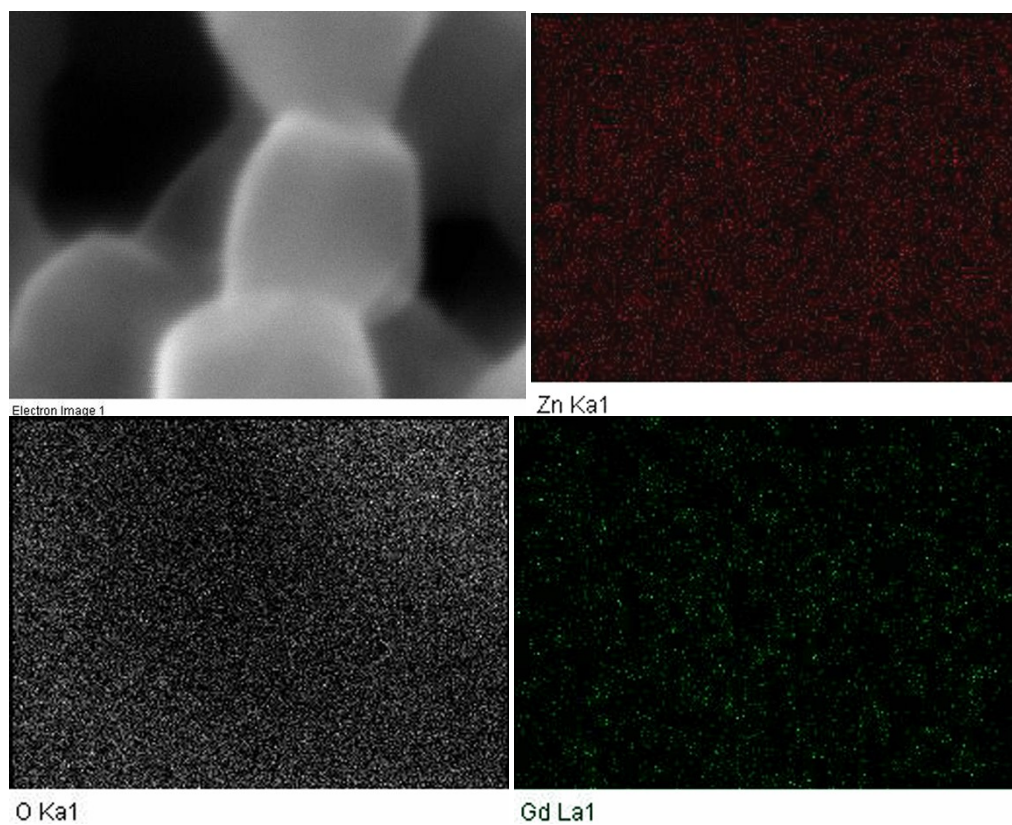


Fig. S2 Elemental mapping (the distribution of the main elements Zn (red), O (white) and Gd (green)) in the core-shell nanostructures.

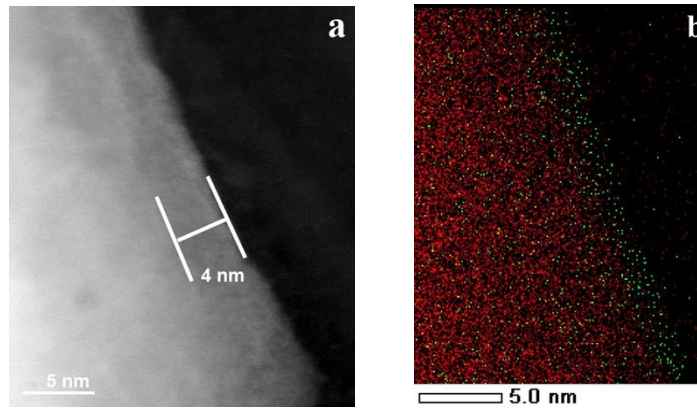


Fig. S3 HRTEM image of the core-shell nanostructures – ZnO NPs coated with Gd₂O₃ shell – (a), and elemental mapping (the distribution of Zn (red) and Gd (green) elements in the core-shell – (b).

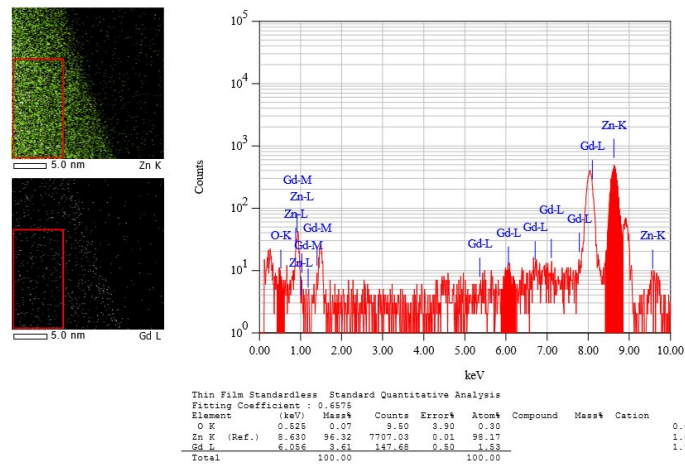


Fig. S4 Elemental mapping and EDX analysis in the core region.

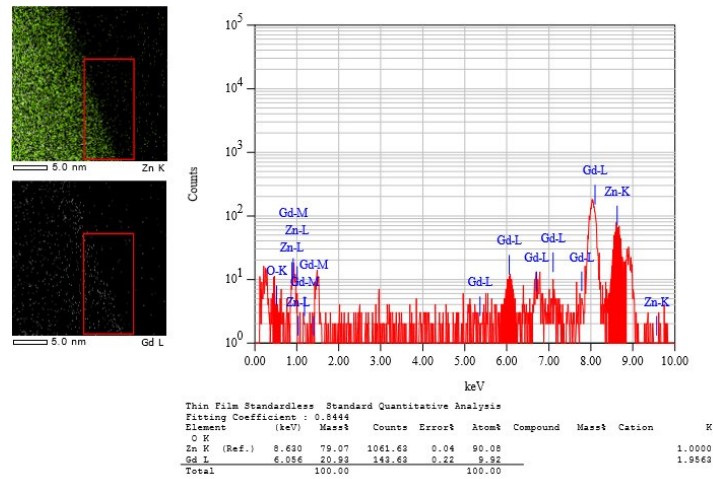


Fig. S5 Elemental mapping and EDX analysis in the core region.

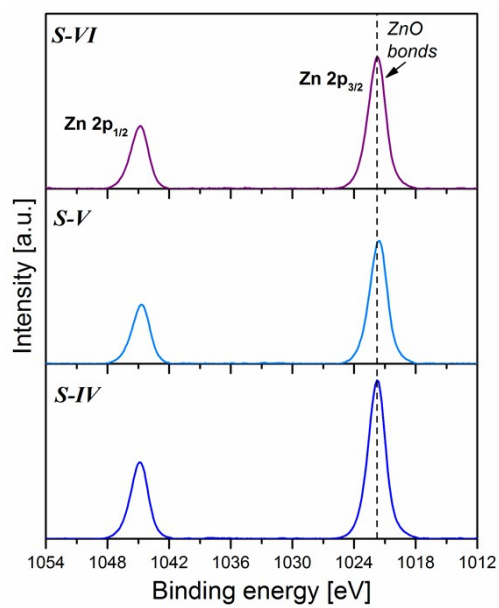


Fig. S6 XPS Zn 2p spectra of the ZnO:Er³⁺-Yb³⁺ NPs modified by Gd³⁺ shell for 6h (**S-IV**), 48h (**S-V**) and 96h (**S-VI**) and annealed at 900 °C for 1h (ZnO:Er³⁺-Yb³⁺@Gd₂O₃ core-shell).