Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Electronic Supplementary Information

Unveiling the Multifunctional Roles of Hitherto Known Capping Ligand, Oleic Acid, as Blue Emitter and Sensitizer in Tuning the Emission Colour to White in Red-emitting Phosphors

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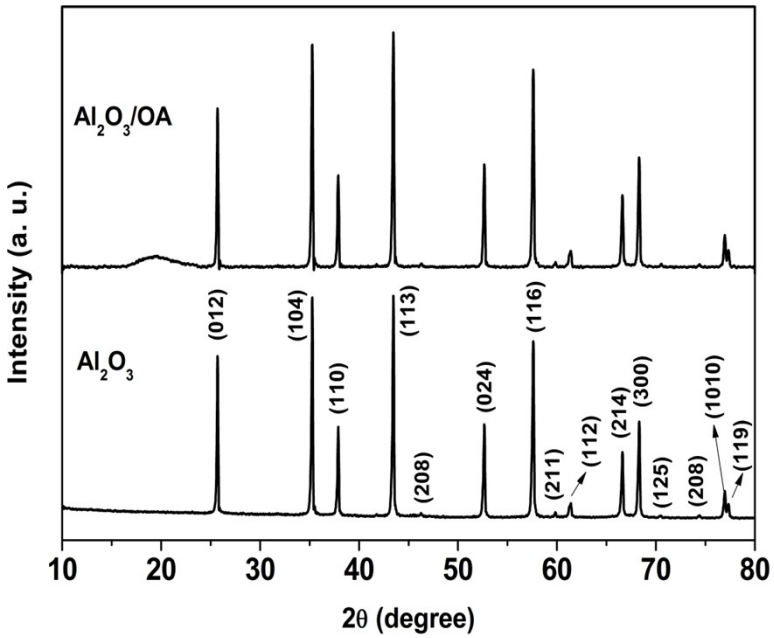


Fig. S1. Powder XRD patterns of Al_2O_3 obtained by combustion synthesis and OA-modified Al_2O_3 by hydrothermal method. All the reflections indexed based on the standard pattern ICDD (#00-046-1212) confirm the formation of Al_2O_3 with corundum structure with rhombhohedral symmetry.

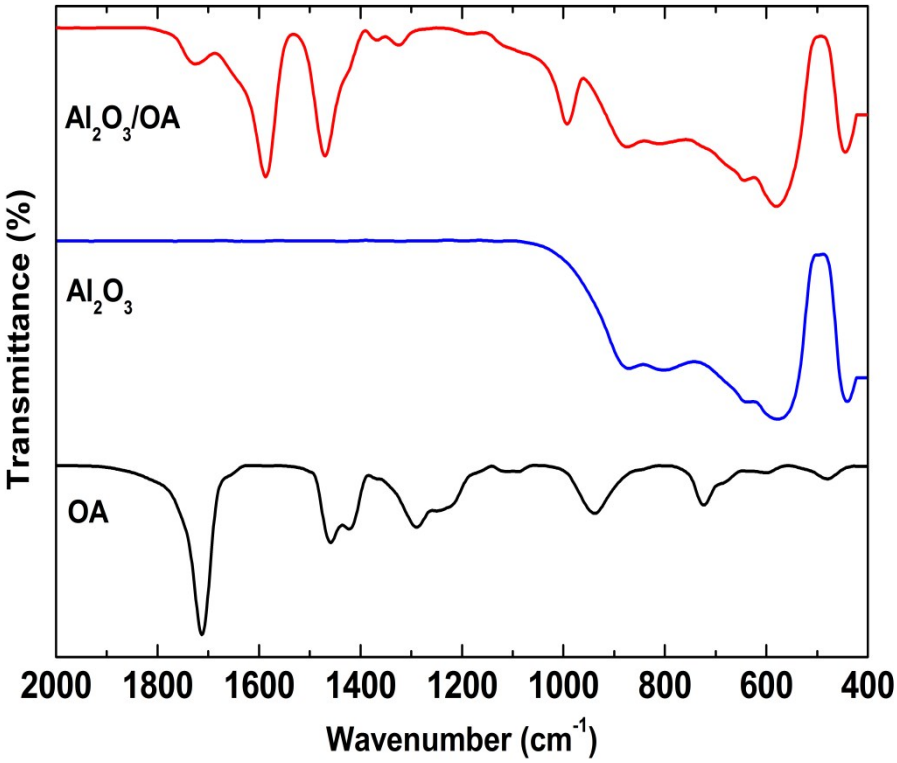


Fig. S2. FT-IR spectra of OA, Al_2O_3 and Al_2O_3/OA.

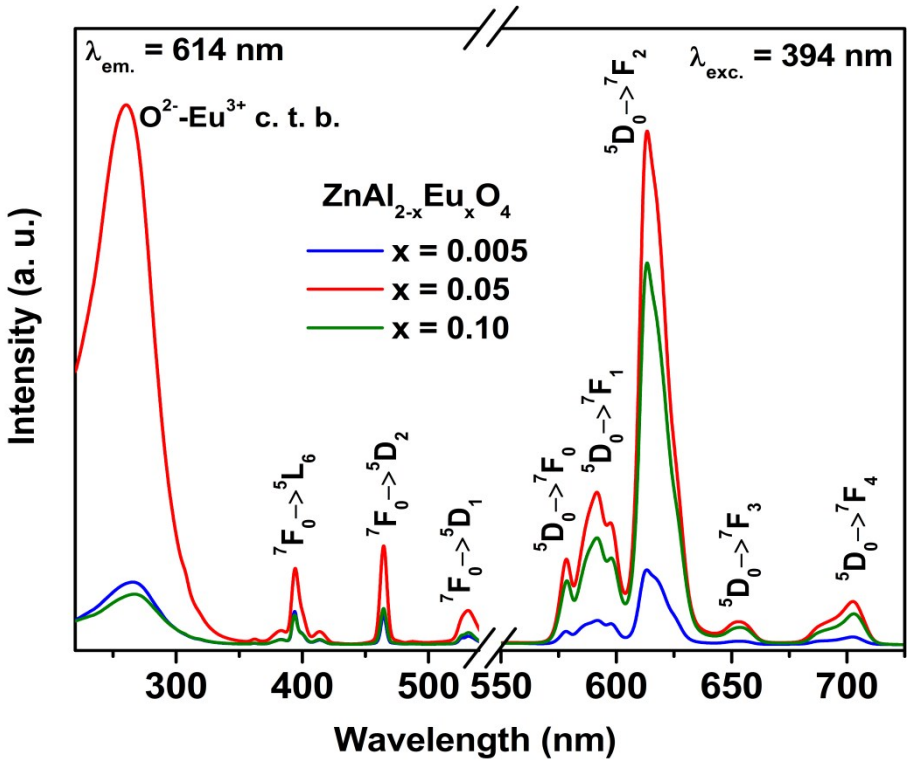


Fig. S3. Room temperature PL excitation ($\lambda_{em.}$ = 614 nm) and emission ($\lambda_{exc.}$ = 394 nm) spectra of $ZnAl_{2-x}Eu_xO_4$ samples revealing the different excitation and emission transitions of Eu^{3+}.

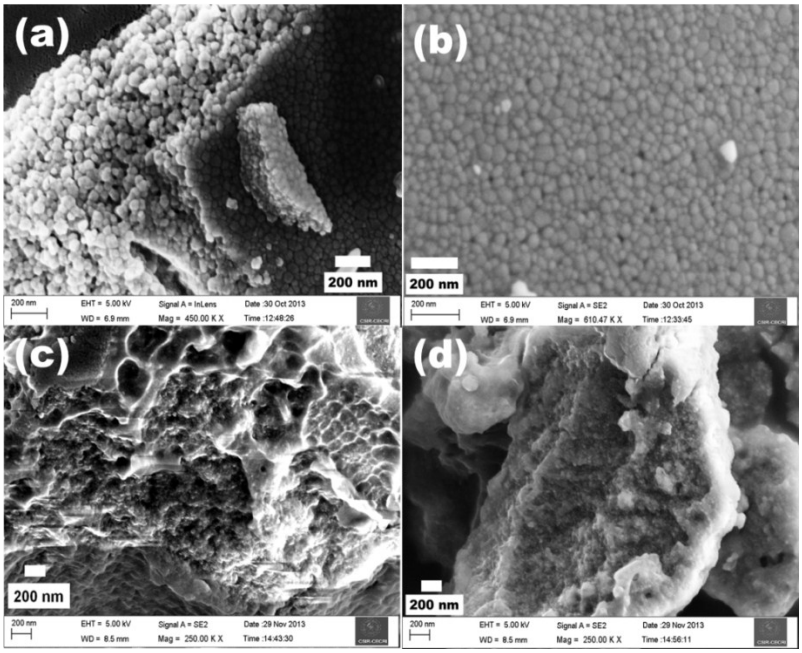


Fig. S4. FE-SEM images of (a), (b) $ZnAl_2O_4$ and (c), (d) $ZnAl_2O_4$/OA.

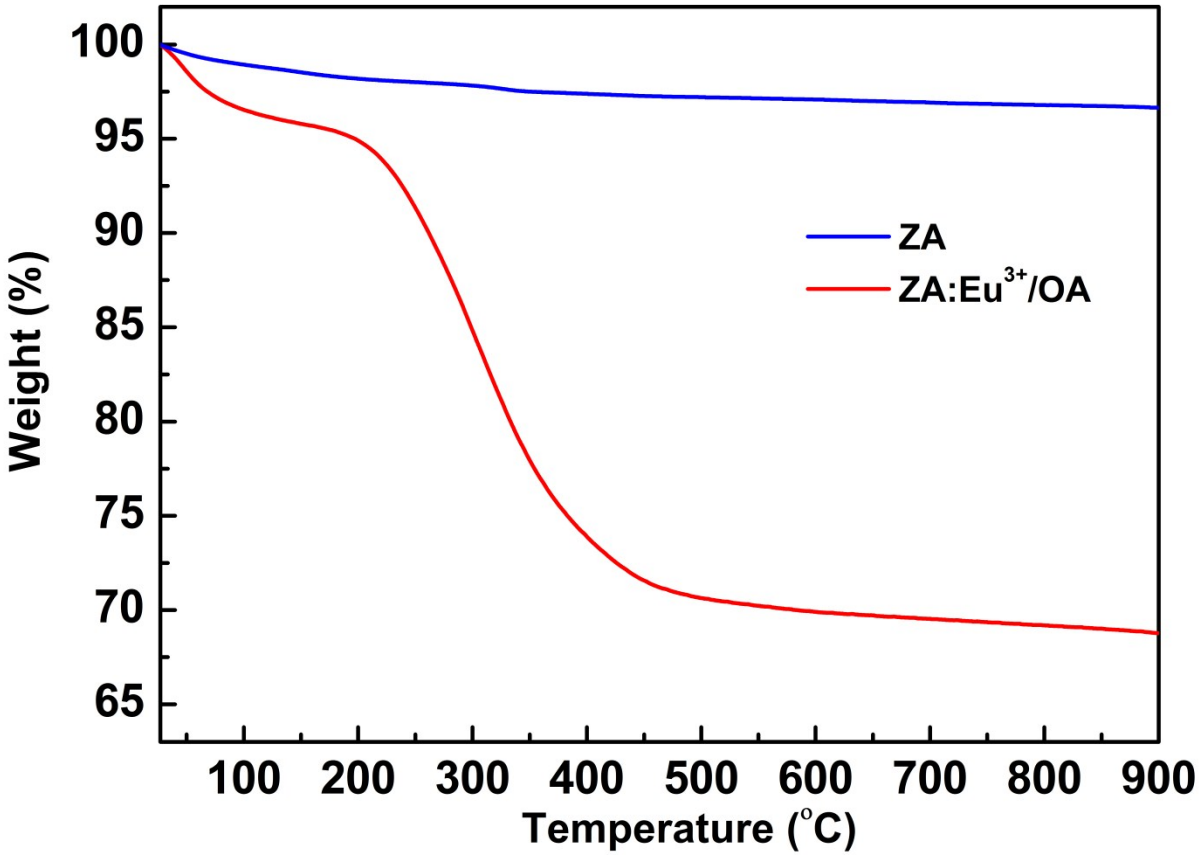


Fig. S5. TGA traces of $ZnAl_2O_4$ and $ZnAl_{1.995}Eu_{0.005}O_4$/OA.

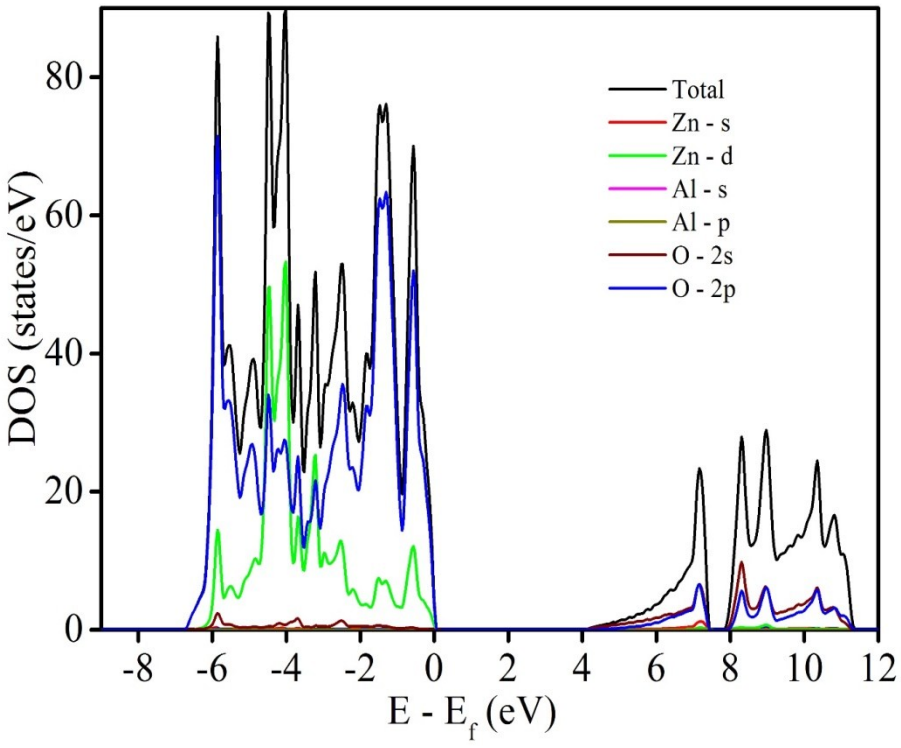


Fig. S6. The DOS of bulk $ZnAl_2O_4$.

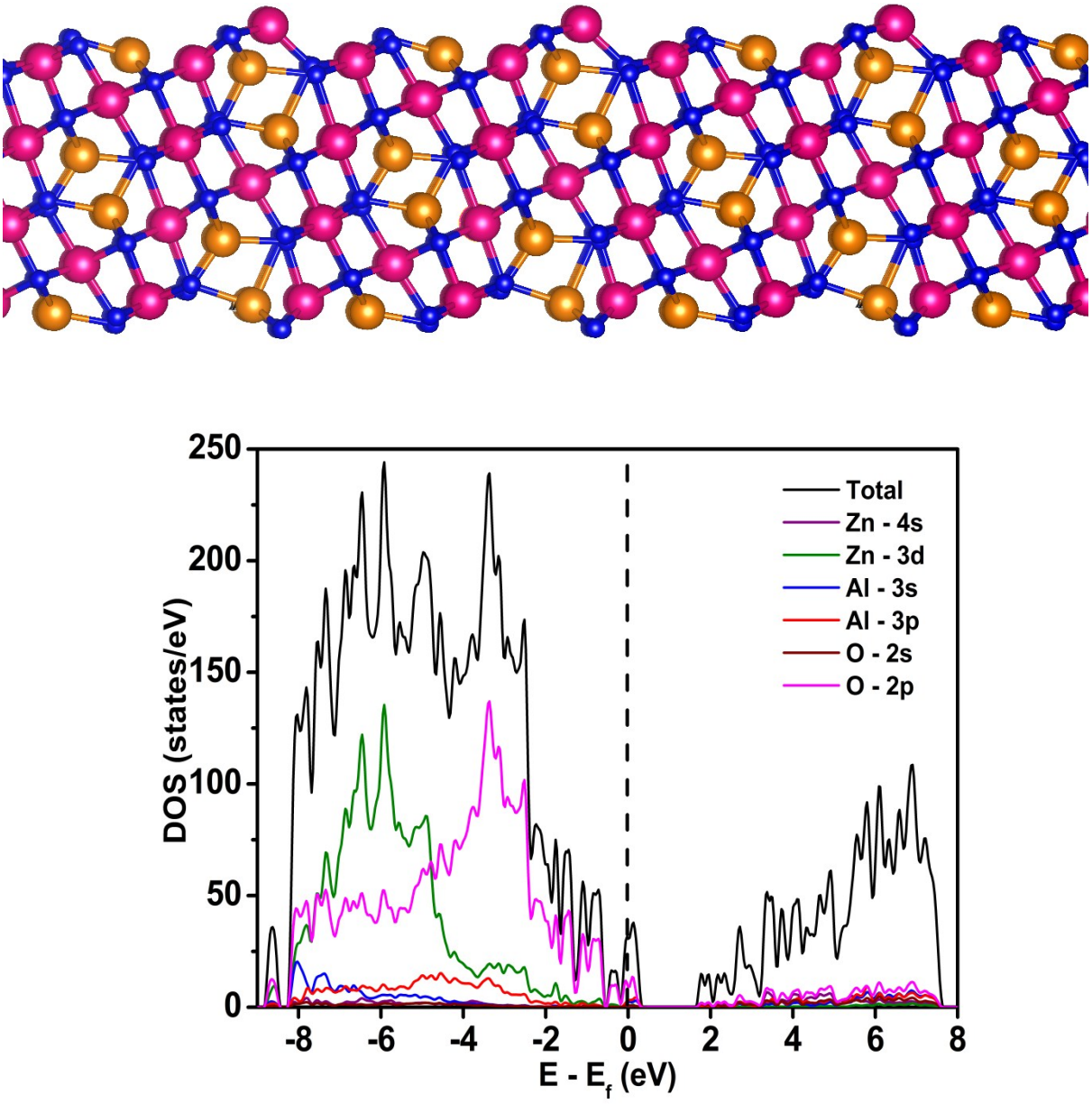
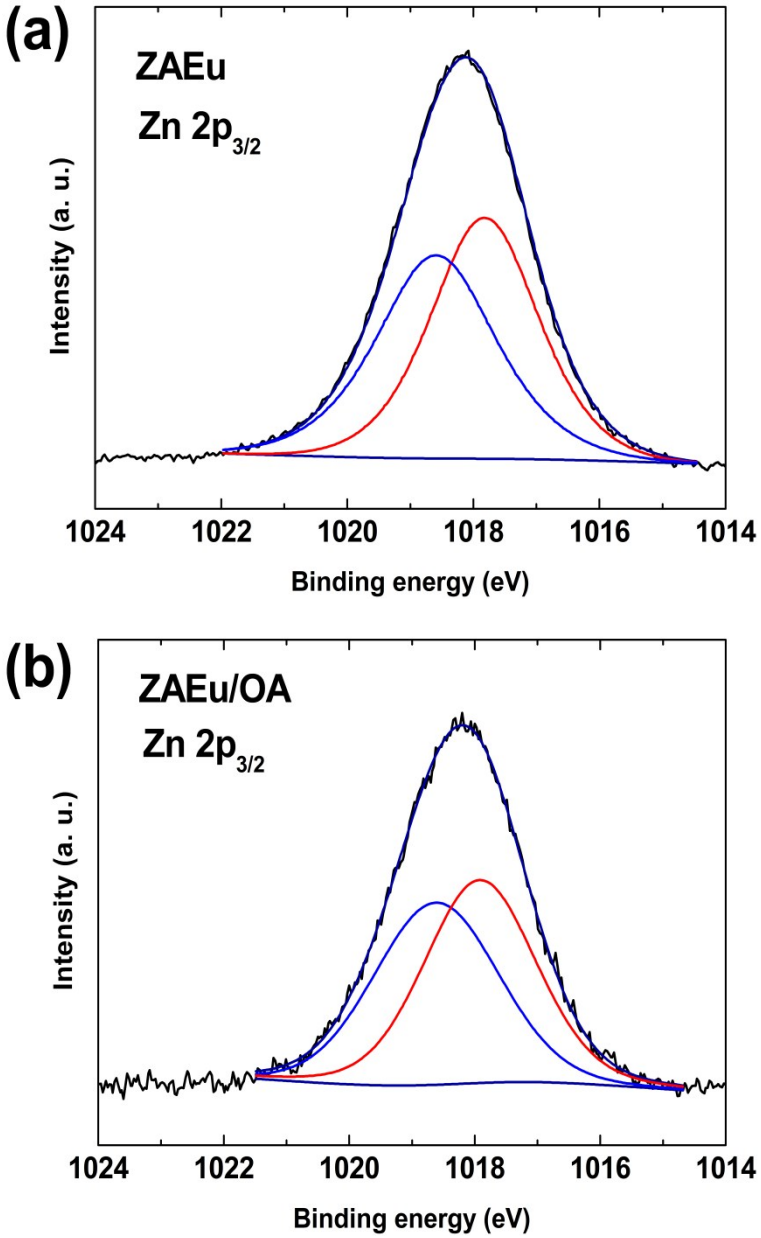
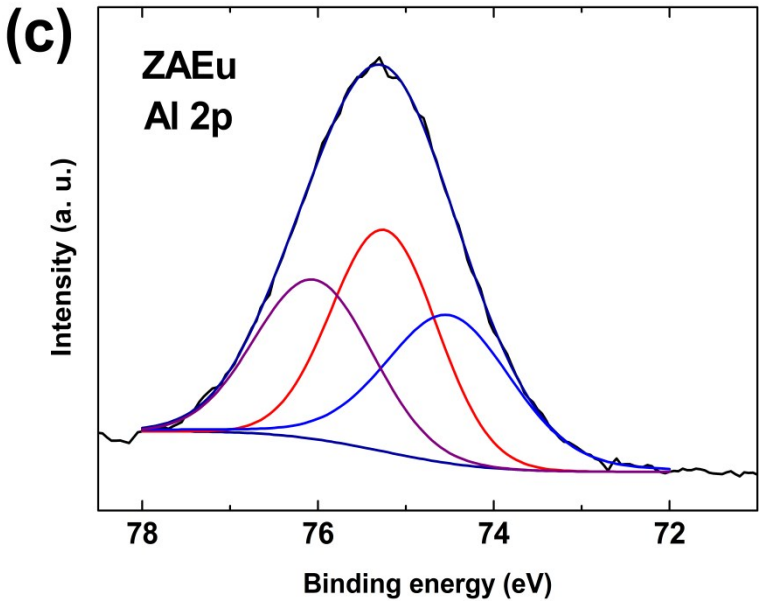
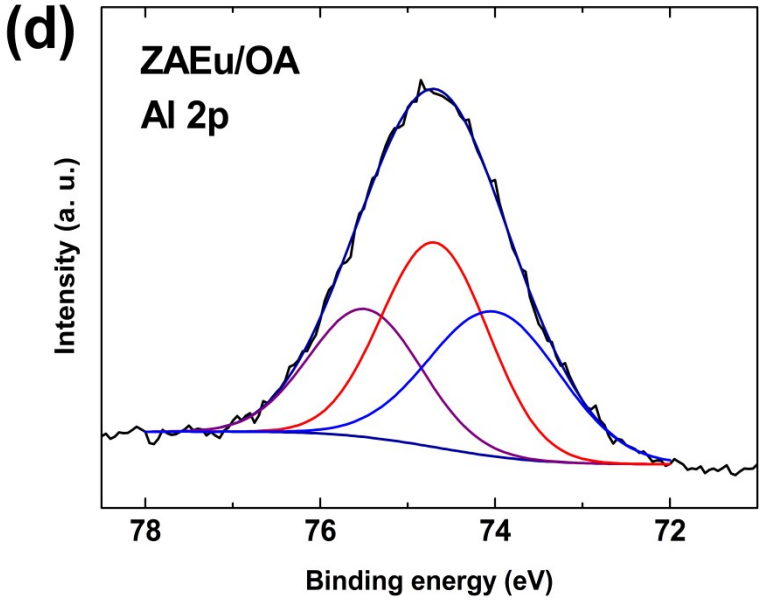


Fig. S7. The optimized structure of (311) surface of $ZnAl_2O_4$. Here, orange, pink, and blue, coloured balls represent Zn, A, and O atoms, respectively. The DOS of (311) surface of $ZnAl_2O_4$ is also shown.


(a)
ZAEu
Zn 2p3/2
Intensity (a. u.)
1024
1022
1020
1018
1016
1014
Binding energy (eV)
(b)
ZAEu/OA
Zn 2p3/2
Intensity (a. u.)
1024
1022
1020
1018
1016
1014
Binding energy (eV)


(c)
ZAEu
Al 2p
Intensity (a. u.)
78
76
74
72
Binding energy (eV)


(d)
ZAEu/OA
Al 2p
Intensity (a. u.)
78
76
74
72
Binding energy (eV)

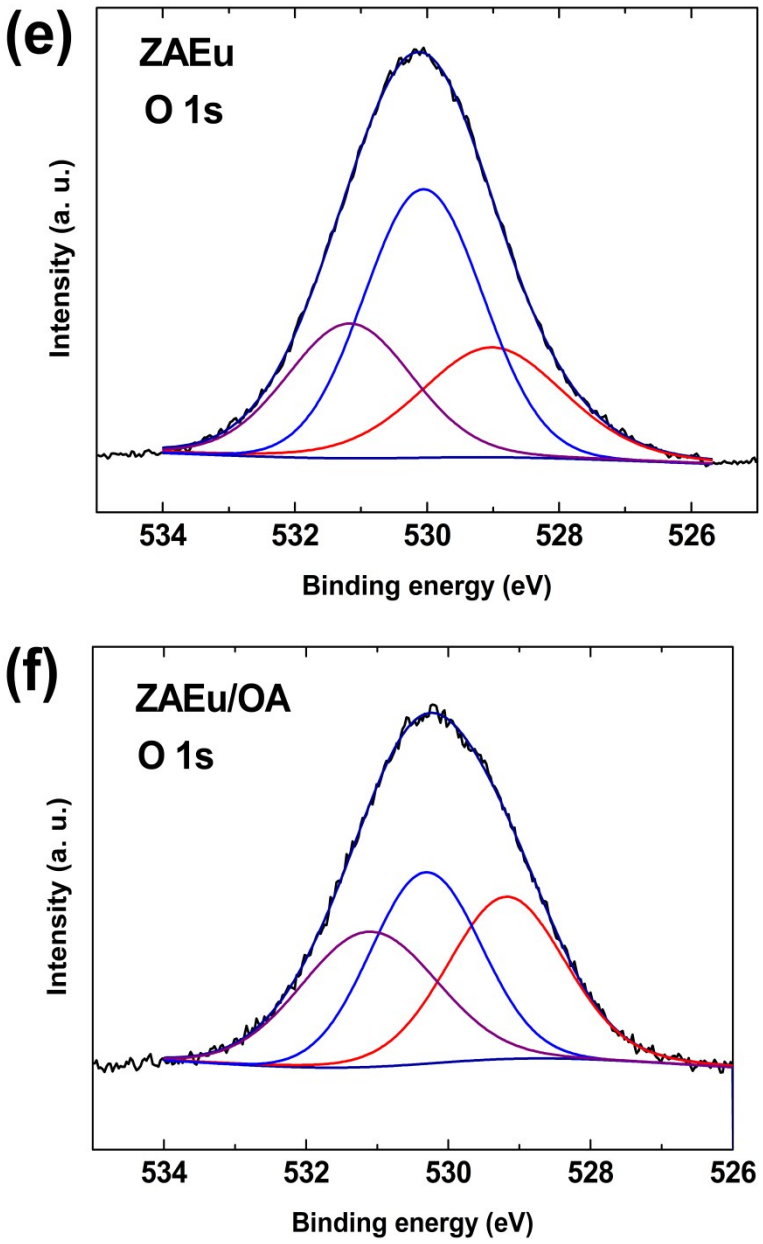


Fig. S8. XPS core level spectra of Zn-2p (a and b), Al-2p (c and d) and O-1s (e and f) in pristine ZA:Eu^{3+} and ZA:0.01Eu^{3+}/OA samples.

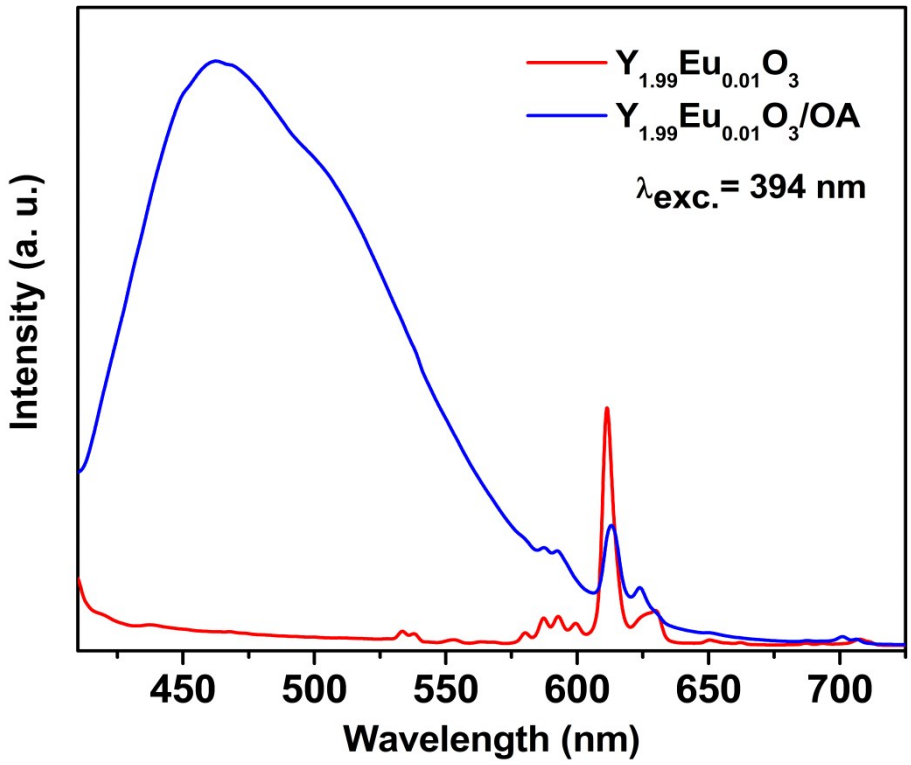


Fig. S9. Room temperature PL emission spectra of (a) pristine and OA-modified $Y_2O_3:Eu^{3+}$ and (b) OA and OA-modified Al_2O_3. The spectrum of OA was recorded in solution state.