Electronic Supplementary Material (ESI) for RSC Advances

Supplementary Information

Eu_2O_3-functionalized ZnO/palygorskite

Xi He, Jing Ouyang, Huaming Yang*

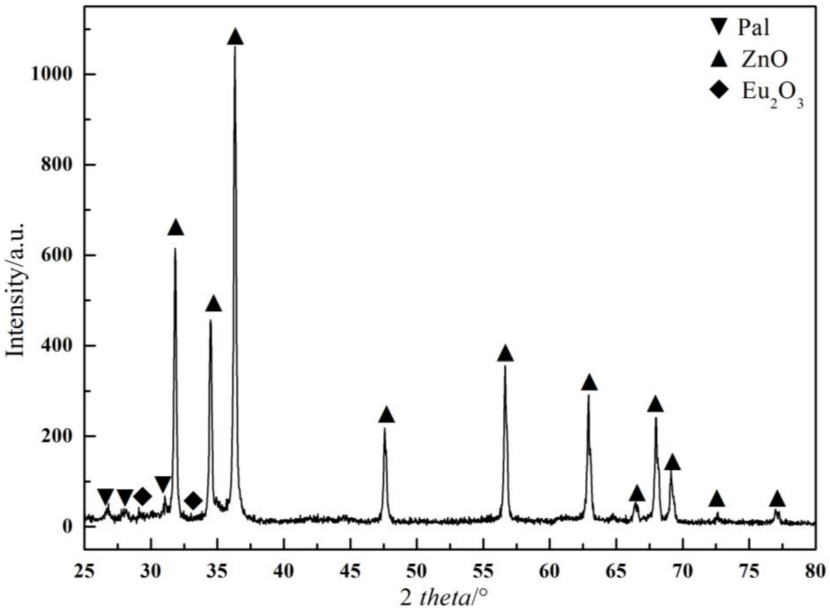

Fig. S1. XRD pattern of Eu_2O_3-ZnO/Pal. The structure of palygorsktie is mostly damaged at the calcination of 800 °C, resulting in the amorphous silica with surface curved fibers. The mass ratio of ZnO to Pal is 1:1, and the mass ratio of Eu_2O_3 to ZnO is 0.1:2.0. Energy transfer from Eu_2O_3 to ZnO was firstly observed in Eu_2O_3-ZnO/Pal, however, the contrast was not so obvious as the lower content of Eu_2O_3. Control experiment was conducted to enlarge this contrast, and to remove the influence of palygorskite in photodegradatio as the adsorption of palygorskite to MB was extremely significant, which made the contrast in photodegradatio not obvious.

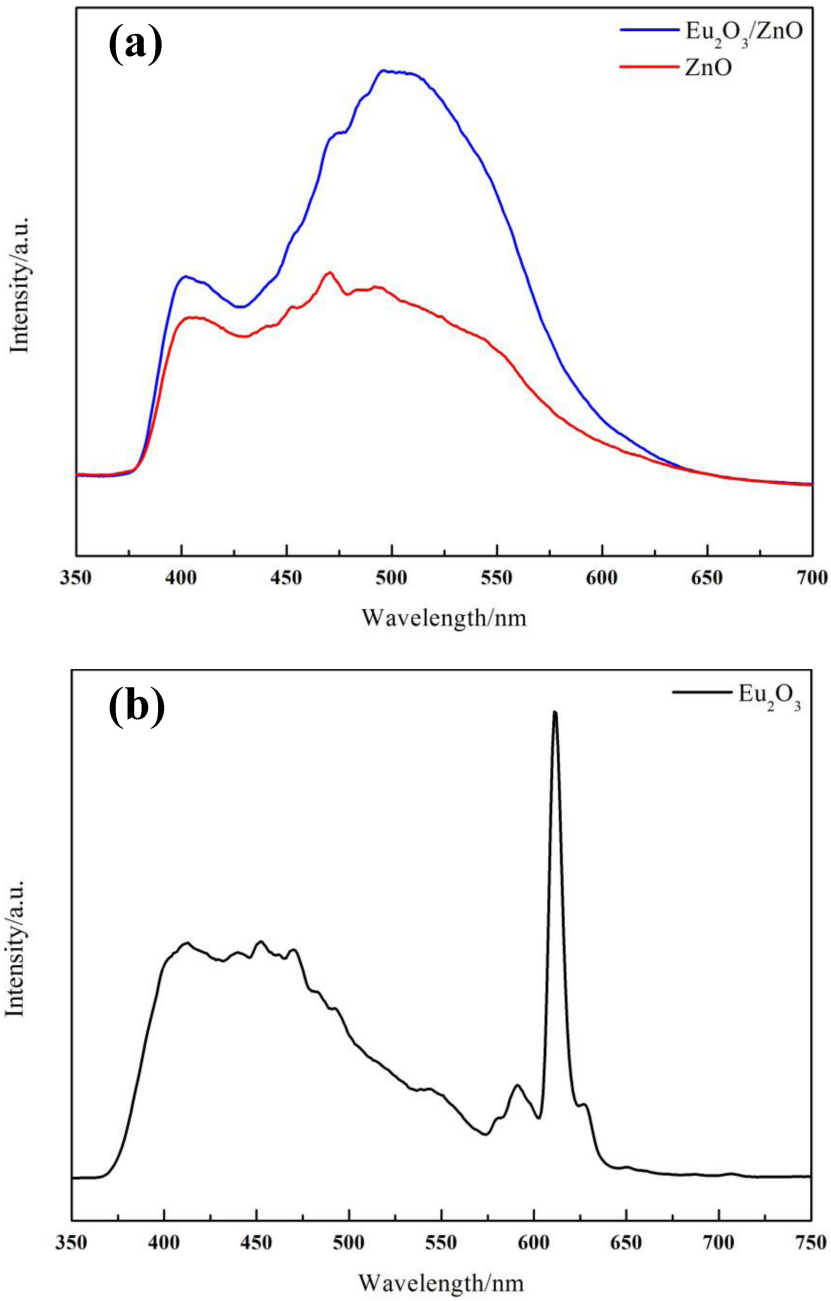

Fig. S2. PL spectra of the samples excited at 254 nm. An excitation wavelength of 254 nm is usually conducted to investigate the luminescence of Eu_2O_3. Energy transfer from Eu_2O_3 to ZnO is also observed by comparing the above two figures. This phenomenon further proved that energy transfer is affected by the interaction between particles.

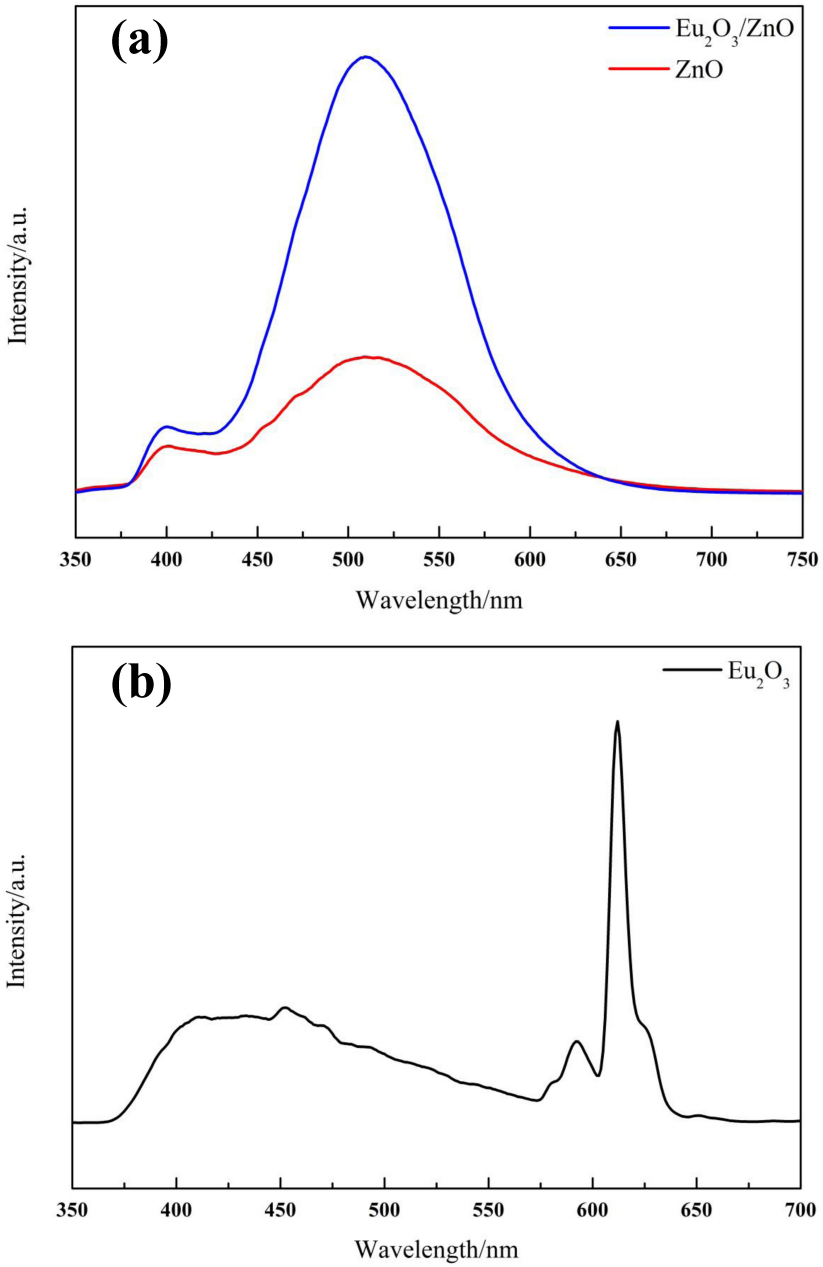

Fig. S3. PL spectra of the samples excited at 325 nm. To further prove the energy transfer, the experiment of PL intensity excited at 325 nm (a widely accepted wavelength in excitation of ZnO, reported in many reports such as 10.1039/c0ce00972e, 10.1021/jp802958x and 10.1063/1.3549633) is conducted. Energy transfer from Eu_2O_3 to ZnO is also observed.

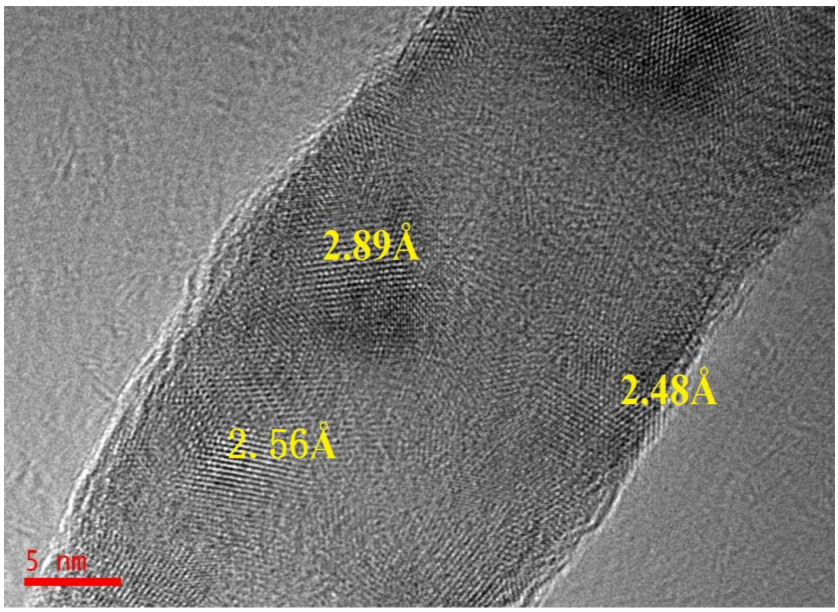

Fig. S4. HRTEM image of Eu_2O_3-ZnO/Pal. It was mentioned that Eu_2O_3 and ZnO nanoparticels are also loaded on Pal separately. The plane distance of 2.48 Å belongs to (101) plane of ZnO (PDF#36-1451) while 2.56 Å, 2.89 Å belong to (411), (321) plane of Eu_2O_3 (PDF#34-0392), respectively. Energy transfer might also happen between them.

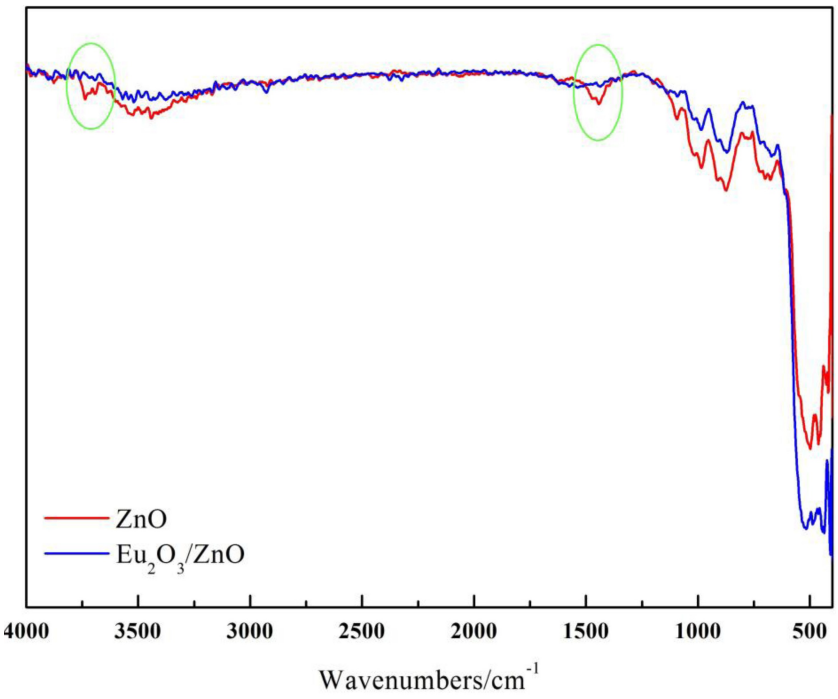

Fig. S5. FTIR spectra of Eu_2O_3/ZnO. FTIR spectra provide an opportunity to know the mechanism of synthesis and to prove the loading of Eu_2O_3 on ZnO. There are two significant peaks in ZnO. The peak around 1475 cm^{-1} is assigned to carbonate-like species, peak around 3750 cm^{-1} attributed to surface hydroxyl. Both peaks almost disappeared when Eu_2O_3 are introduced, which suggests the interaction between ZnO and Eu_2O_3.

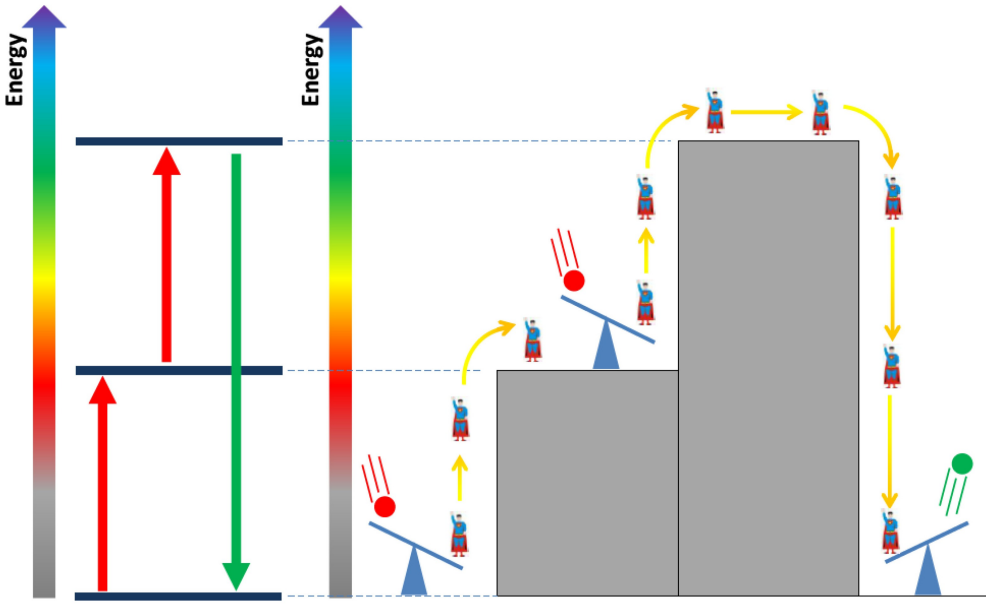

Fig. S6. Schematic illustration of energy transfer from Eu_2O_3 to ZnO.