Supplementary Materials for RSC Advances

Morphology controlled growth of ZnAl-layered double hydroxide and ZnO nanorod hybrid nanostructures by solution method

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1. Fourier transform infrared (FTIR) spectroscopy results

Fourier transform infrared spectroscopy (FTIR, Thermo Scientific, Continuum) was measured for the ZnAl-layered double hydroxide (LDH) and ZnO nanorod (NR) structures on the ZnO/Al_2O_3 double seed layer with ZnO thicknesses of 0 and 15 nm, respectively. The ZnO NRs (blue line) shows no trace of the vibration mode from the chemicals, while that from the ZnAl-LDH shows some bands from the chemical species. It should be noted that the ZnAl-LDH shows band near 1381 cm^{-1}. The appearance of a strong band near 1381 cm^{-1} can be assigned to the v3 nitrate group, NO_3^-, the counter anion in the ZnAl-LDH [P. Fu, K. Xu, H. Song, G. Chen, J. Yang and Y. Niu, *J. Mater. Chem.*, 2010, **20**, 3869-3876.].

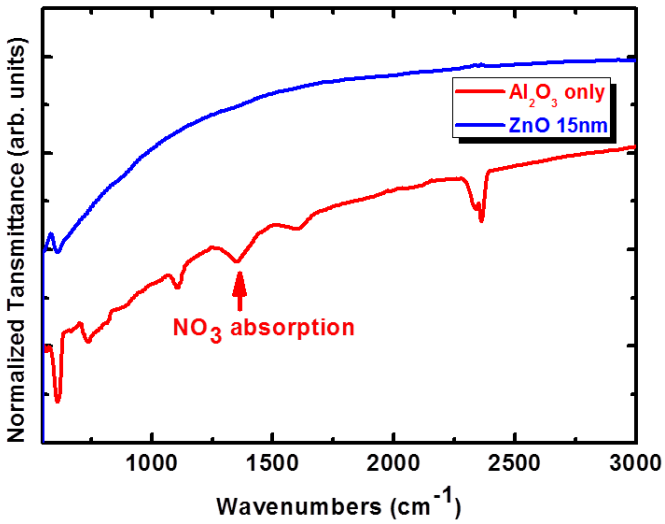

Figure S1. FTIR spectra of the ZnO NRs and ZnAl-LDH hybrid structures on the ZnO/Al_2O_3 double seed

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layer with ZnO thicknesses of 0 and 15 nm.

2. Inductively coupled plasma mass spectrometry (ICP-MS)

Inductively coupled plasma mass spectrometry (ICP-MS; iCAP-Qs, Thermo Scientific) was measured for the ZnAl-LDH grown on the Al_2O_3/ZnO double seed layer with ZnO layer thicknesses of 0 nm. The sample was prepared by dissolving in an aqua regia consisting of hydrochloric acid (HCl) and nitric acid (HNO_3) with 3:1 ratio. The dissolved solution was diluted with DI water for analysis. The results show that the samples contain Al and Zn with 20 and 41wt%, respectively. Therefore, the Zn/Al ratio in the ZnAl-LDH in our sample was around 2, indicating that the formula of the LDH compounds is [$Zn_2Al(OH)_2$][$NO_3^- \cdot mH_2O$].

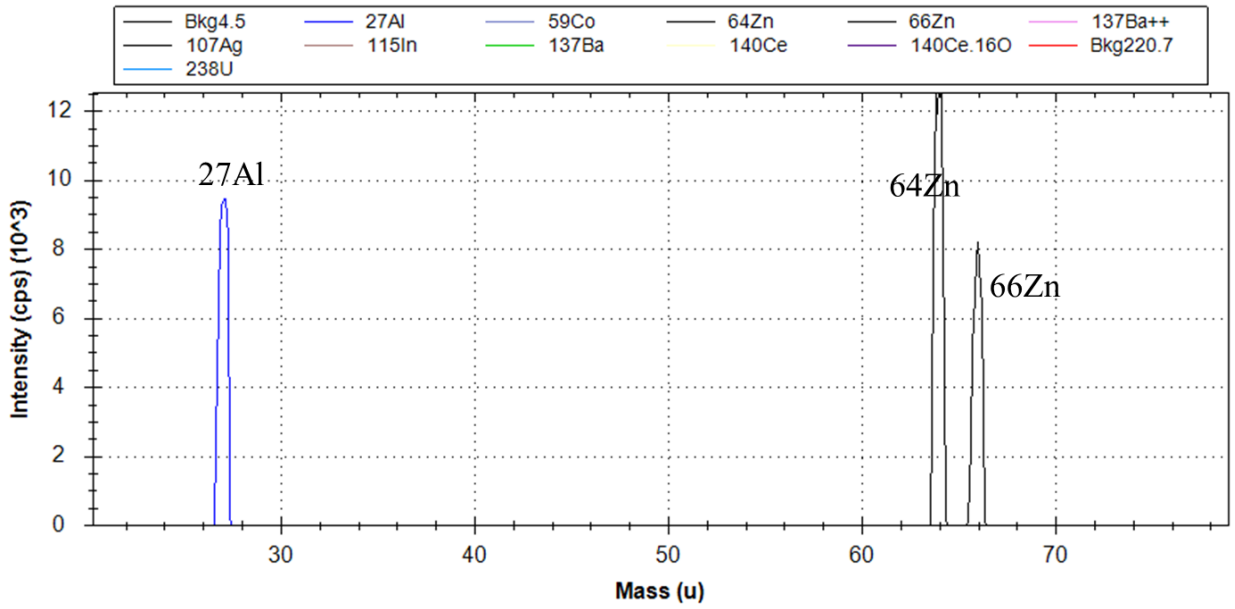

Figure S2. ICP-MS spectra of the ZnAl-LDH grown on the Al_2O_3/ZnO double seed layer with ZnO layer thicknesses of 0 nm.