Supporting Information

Al_2O_3 Buffer-Facilitated Epitaxial Growth of High-Quality ZnO/ZnS Core/Shell Nanorod Arrays

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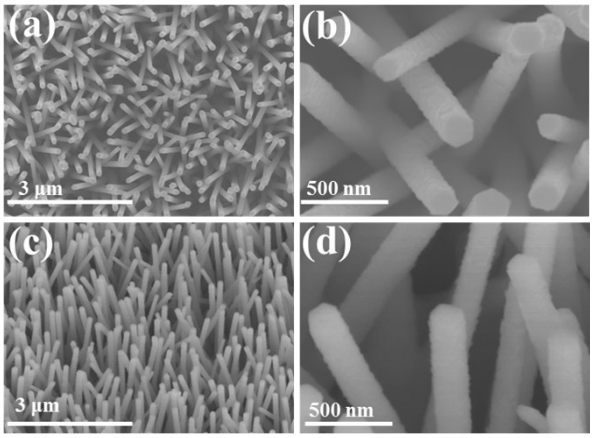

Fig. S1. (a,b) Top-view and (c,d) tilt view of **l**ow- and high-magnification SEM images of the ZnO/ZnS core/shell nanorod arrays without Al_2O_3 buffer layer.

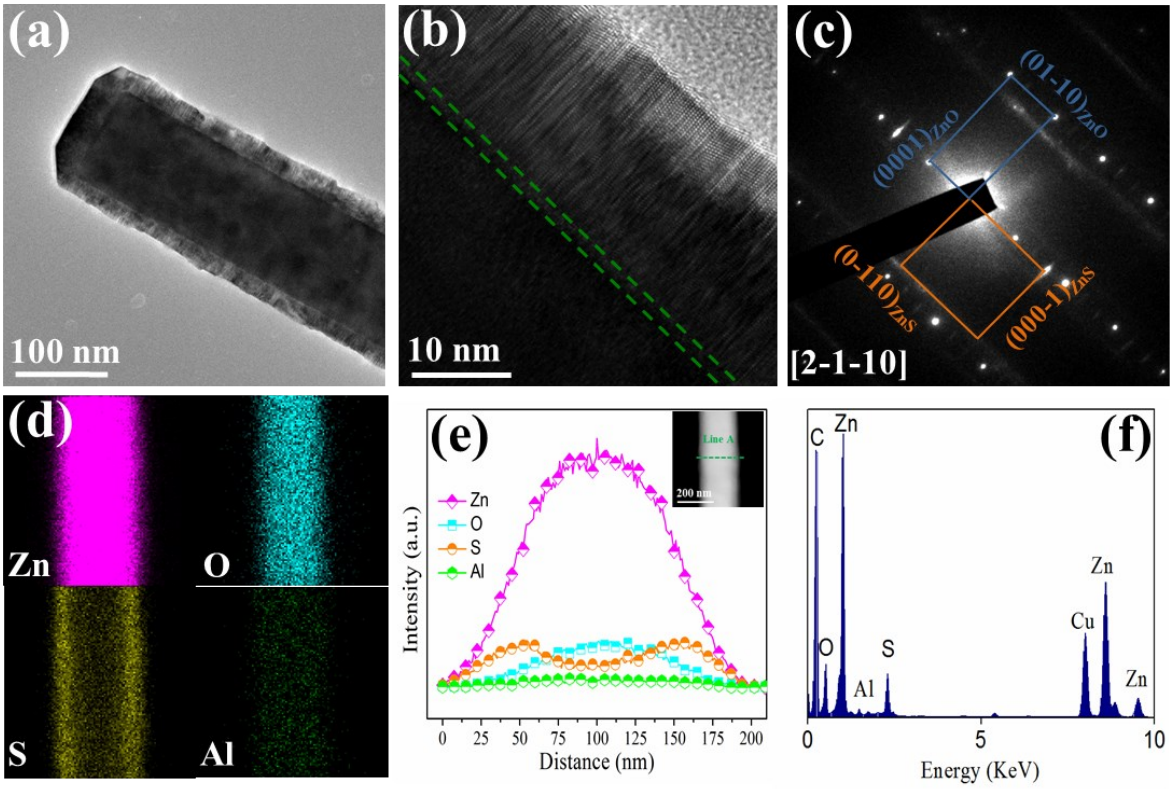

Fig. S2 (a) TEM image of the ZnO/ZnS core/shell nanorods with 2 nm Al_2O_3 as buffer layer. (b) Corresponding SAED pattern and (c) HRTEM image of (a). (d) ADF-STEM image and corresponding elemental mappings of the core/shell nanorod. (e) EDS line scan data from the core/shell heterostructure. (f) EDS line scan data corresponding to line A. The thickness of the Al_2O_3 is 1 nm.

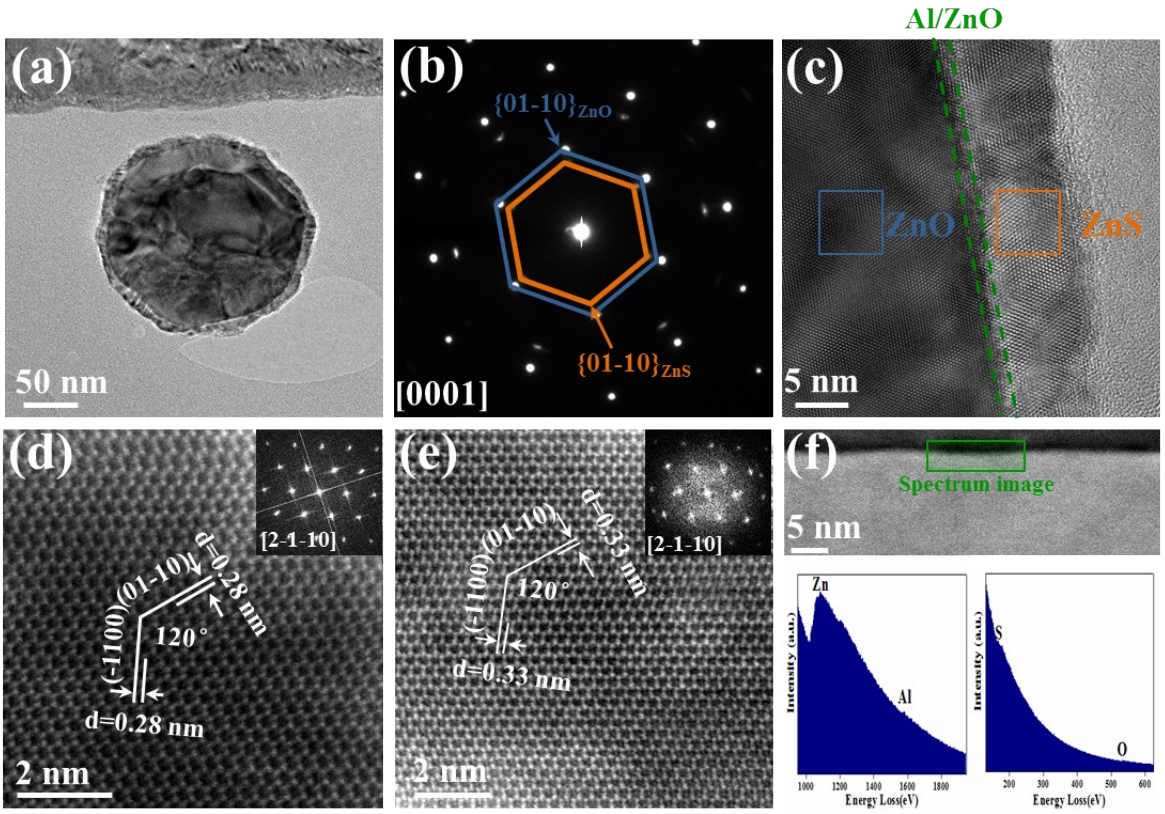

Fig. S3 (a) TEM image of the cross-section sample. (b) Corresponding SAED pattern and (c) HRTEM image of (a), respectively. (d) and (e) Enlarged HRTEM images recorded from regions i and ii in (c), respectively. (f) ADF image with spectrum image of the core/shell heterostructure and EELS spectra obtained from the spectrum image.

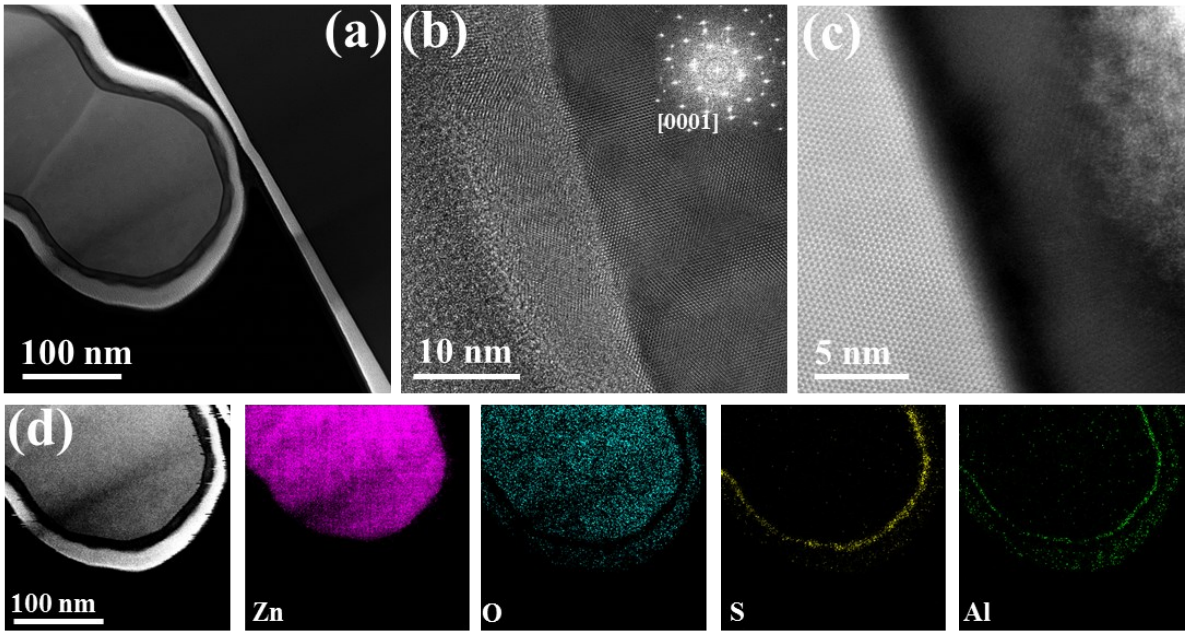

Fig. S4 (a) TEM image of the cross-section sample. (b) Corresponding HRTEM and ADF-STEM images of (a), inset is the corresponding SAED pattern. (d) ADF image and corresponding elemental mappings of the core/shell heterostructure.

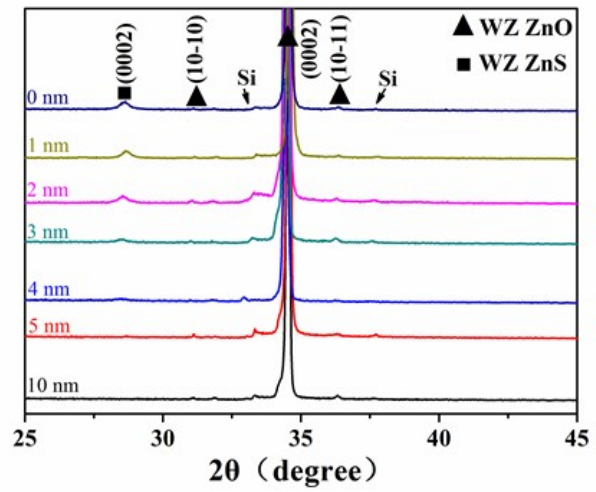

Fig. S5 XRD patterns of ZnO/ZnS core/shell nanorod arrays with different thicknesses of Al_2O_3 as buffer layer.

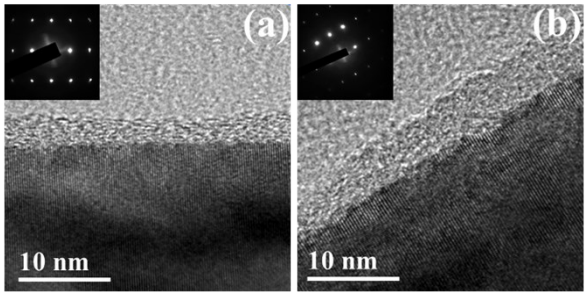

Fig. S6. HRTEM images of the obtained (a) 2 nm and (b) 4 nm Al_2O_3-coated ZnO after heating, insets are corresponding SAED patterns.

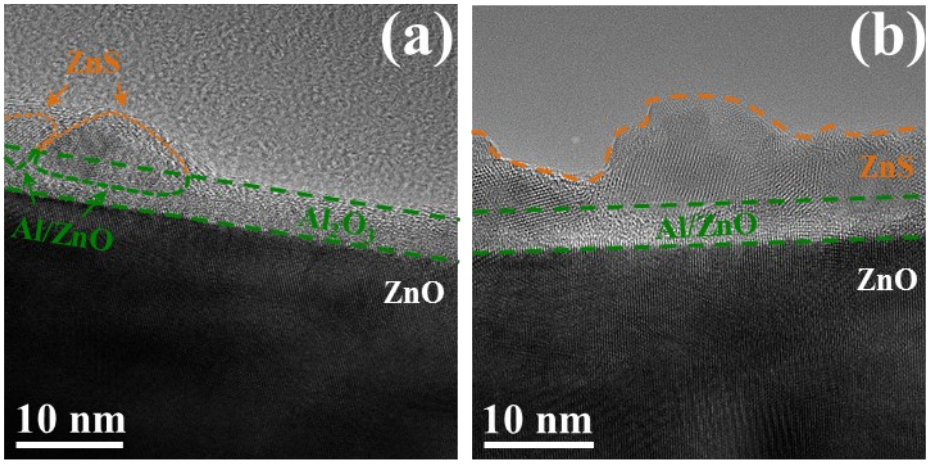

Fig. S7. (a-d) HRTEM images of the obtained core-shell heterostructures (4 nm Al_2O_3 as buffer layer) at different growth stages. Note: the heterostructures shown in (a-d) were not recorded from the same one.

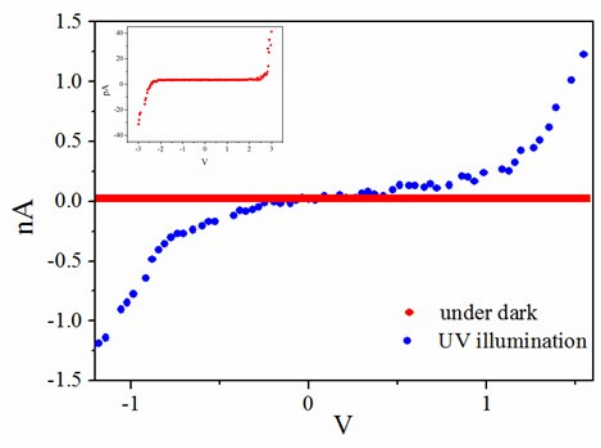

Fig. S8. I–V curves of diode consisting of core/shell heterostructure without Al_2O_3 in the dark （red） and in the presence of 365 nm illumination (blue), respectively.