Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Carriers Transport in Quantum Dot Quantum Well Microstructures of Self-assembled CdTe/CdS/ligand Core-shell System

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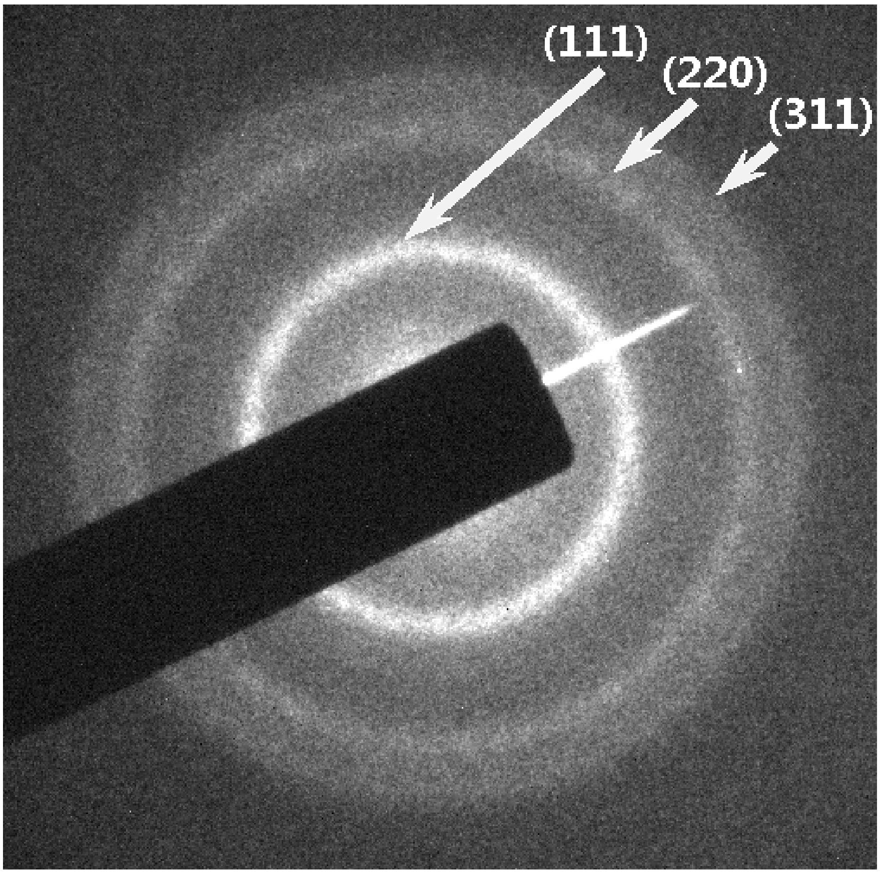
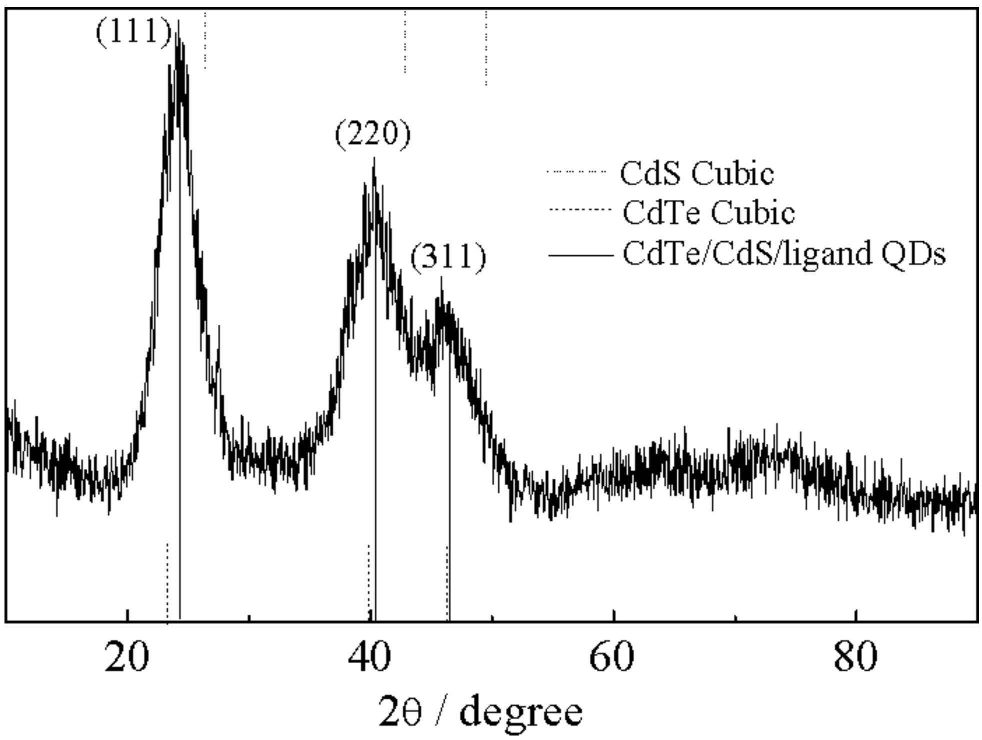
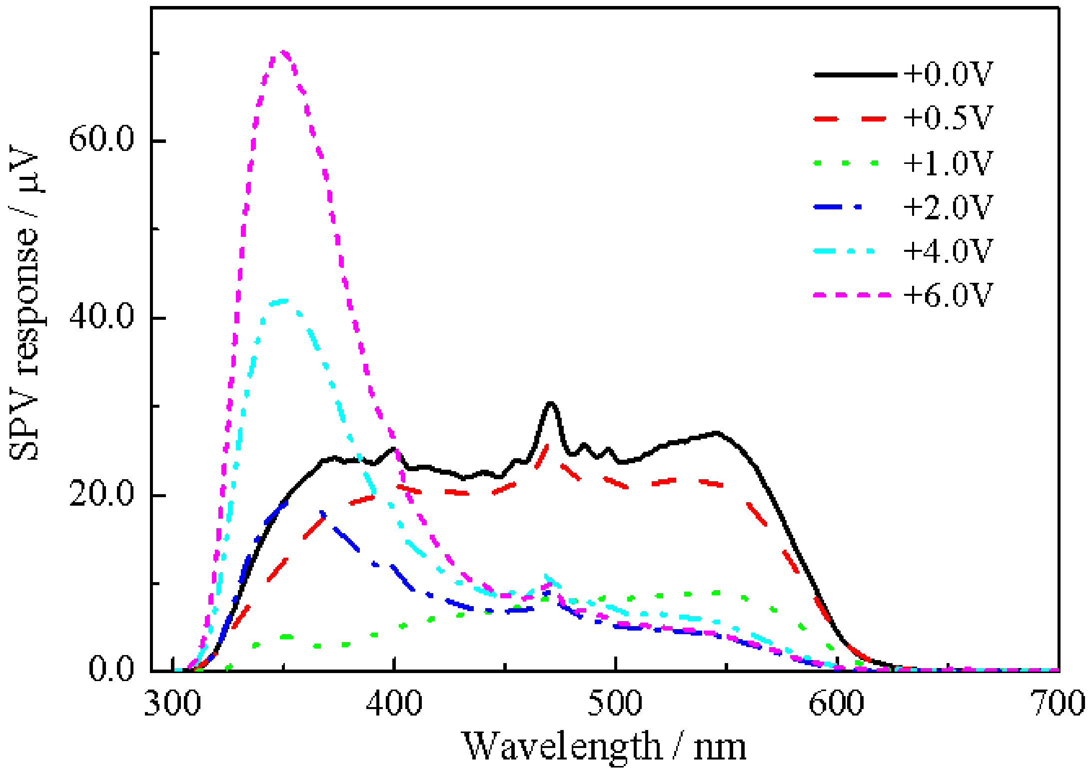
According to the electron diffraction pattern and the indexing analysis, and X-ray diffraction curve, priority the shell-CdS grew in the (111) planes of the CdTe lattices. This implied that a distortion of the lattice cell occurred because sulfur atoms in the ligand MPA partially replaced tellurium atoms located at the surfaces and the boundary of CdTe nanoparticles.



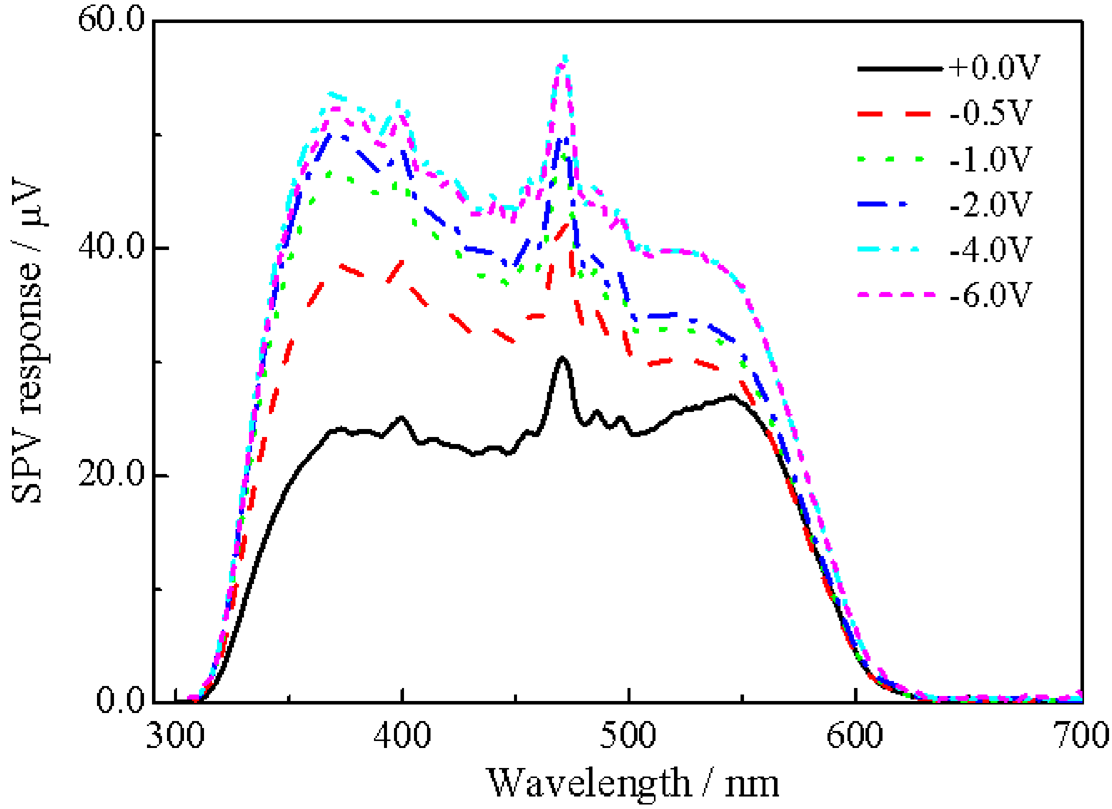
SI Fig. 1 The electron diffraction pattern of TEM of sample MPA-r.



SI Fig. 2 X-ray diffraction curve of the sample MPA-r.



(a)



(b)

SI Fig.3 Electric field induced surface photovoltaic spectroscopy (EFISPS) of the sample MPA-r at external positive electric field (a) and negative electric field (b).

The intensity of the SPV response peaks at 470 nm and 540 nm of the sample MPA-r decreased with increasing the external positive electric field as shown in SI. Fig. 3a, and increased with increasing the absolute value of external negative field as seen in SI. Fig. 3b. The two situations above confirmed that the sample MPA-r displayed a good hometype heterostructure with p-type, because the direction of the build-in field of the sample with p-type characteristic was consistent with that of the external negative electric field. However, the intensity of the SPV response peak at about 350 nm dramatically increased with increasing the external positive electric field after decreased as shown in SI. Fig. 3a, even though the changed trend of the peak was similar to the other two at the external negative field in SI. Fig. 3b. This implied that those unbonded lone-pair electrons in the ligand may result in the so-called n-π^* transition, causing the n-type SPV characteristic of the sample upon illumination with the photon energy $h\upsilon \geq E_{g,\ outer\text{-}layer\text{-}ligand}$ and at high external positive electric field as shown at the short wavelength region of SI. Fig. 3a.