

Fig. 1 The XRD pattern of the ZnO NRs/FTO substrate.

Fig. 1 presents XRD pattern of the ZnO NRs/FTO substrate. From the curve, we can see there is a strong peak centered at  $34.6^\circ$  and a weak peak located at  $31.8^\circ$ ,  $36.4^\circ$ ,  $47.6^\circ$ ,  $56.7^\circ$  and  $63.1^\circ$ , which respectively belongs to (002), (001), (101), (102), (110) and (103) diffraction peak of ZnO. The strong diffraction peak of (002) indicates ZnO NRs grow along the c-axis orientation.

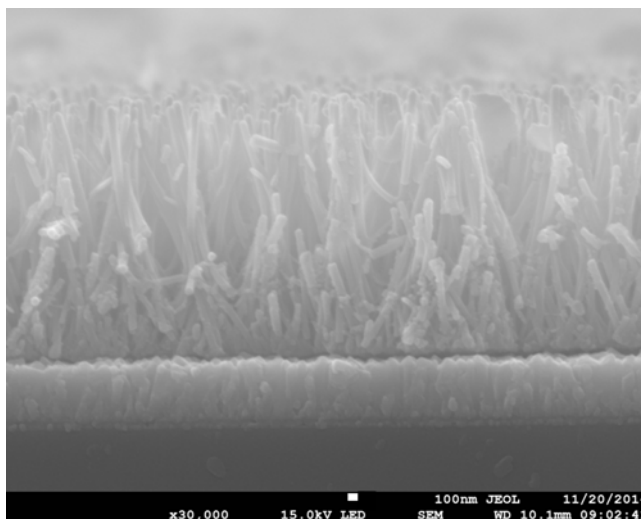


Fig. 2 SEM cross-section of the MgO coated ZnO nanorods, which was apart from the device

Fig. 2 display cross-sectional views of SEM images of the ZnO NR arrays coated with MgO layer. In order to accurately know the structure of our devices, we

prepared the *n*-ZnO nanorods/*i*-MgO/*p*-GaN structure device, and then the ZnO NRs coated MgO were peeled off from the device for investigating their cross-sections. From the image, compared with the ZnO NRs without MgO layer (Fig. 2(b) in the manuscript), we can see MgO layer is coated on ZnO uniformly, the nanorod gets rough and thick with the number of the diameter of about 100 nm. So based on the diameter of ZnO NRs of  $\sim 90$  nm, we deduce the thickness of the MgO layer is about 5 nm.