

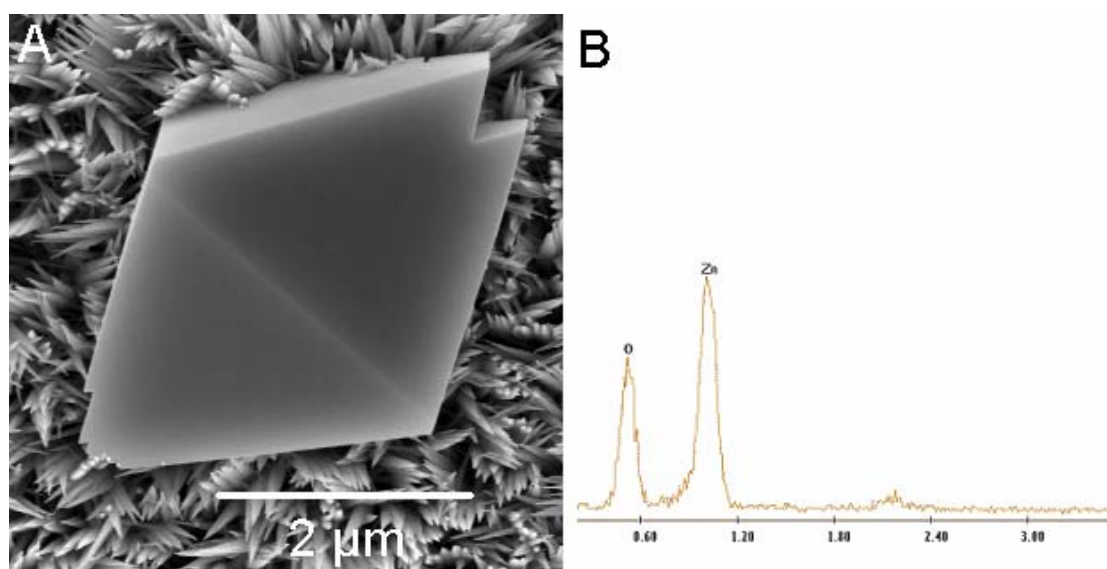
## Supporting Information

# Controlled One-step Fabrication of Highly Oriented ZnO Nanoneedles/nanorods Array at Near Room Temperature

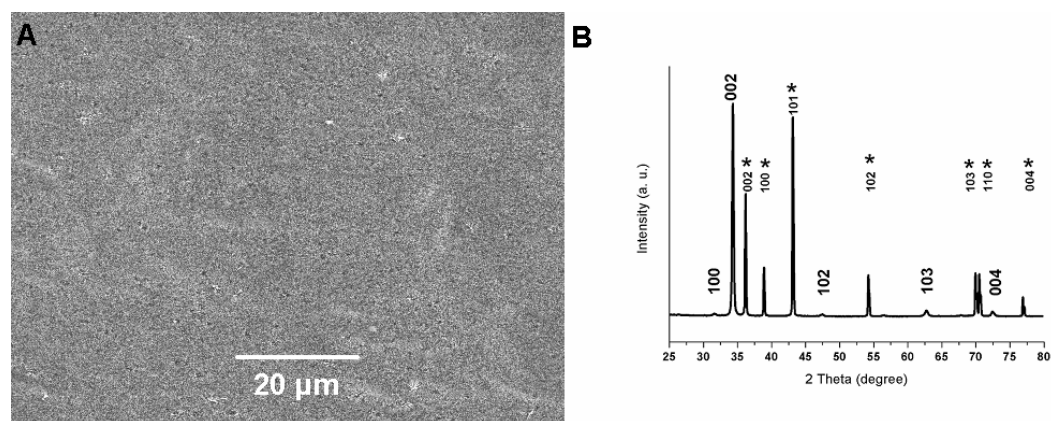
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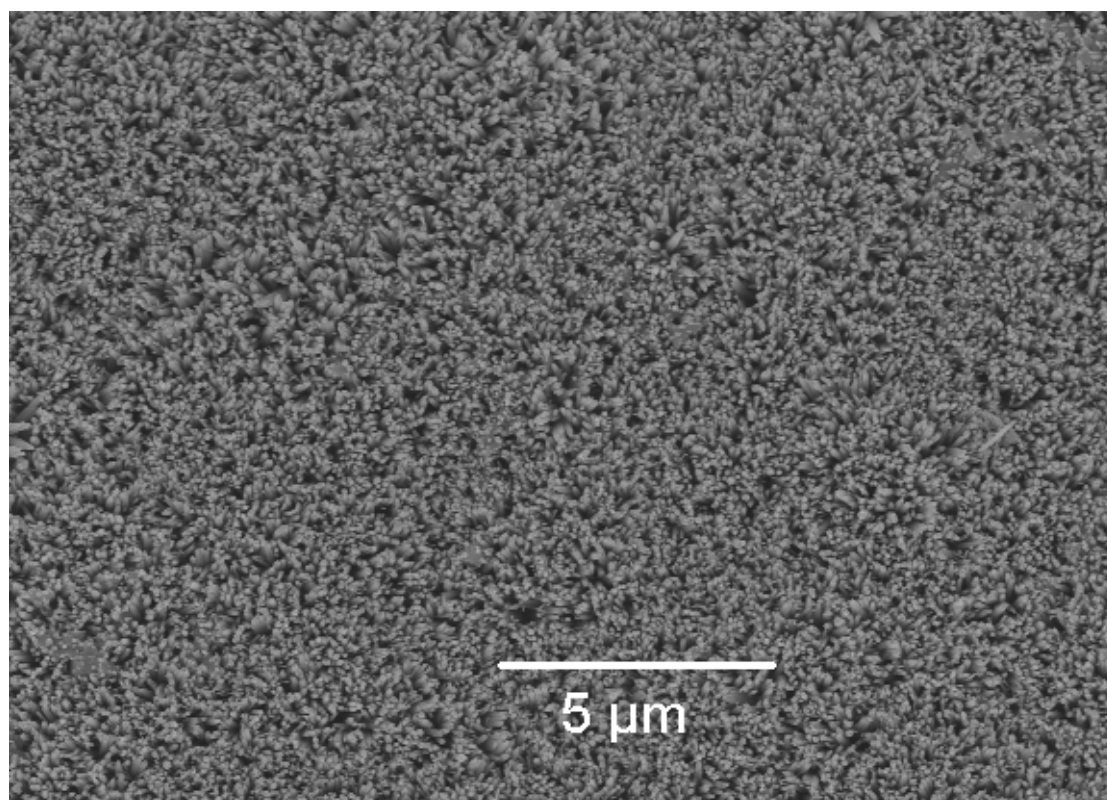
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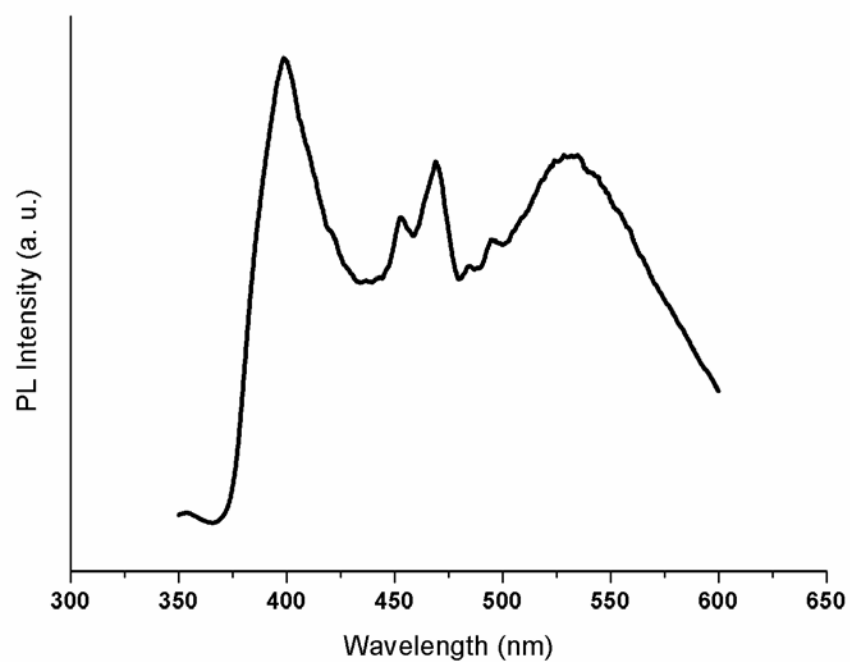
**Figure S1.** A) SEM image of an orthorhombic Zn(OH)<sub>2</sub> crystal on the ZnO nanoneedles array (20 °C, 12 h); B) EDS of the Zn(OH)<sub>2</sub> crystal reveals that atomic ratio of Zn : O = 1:2.



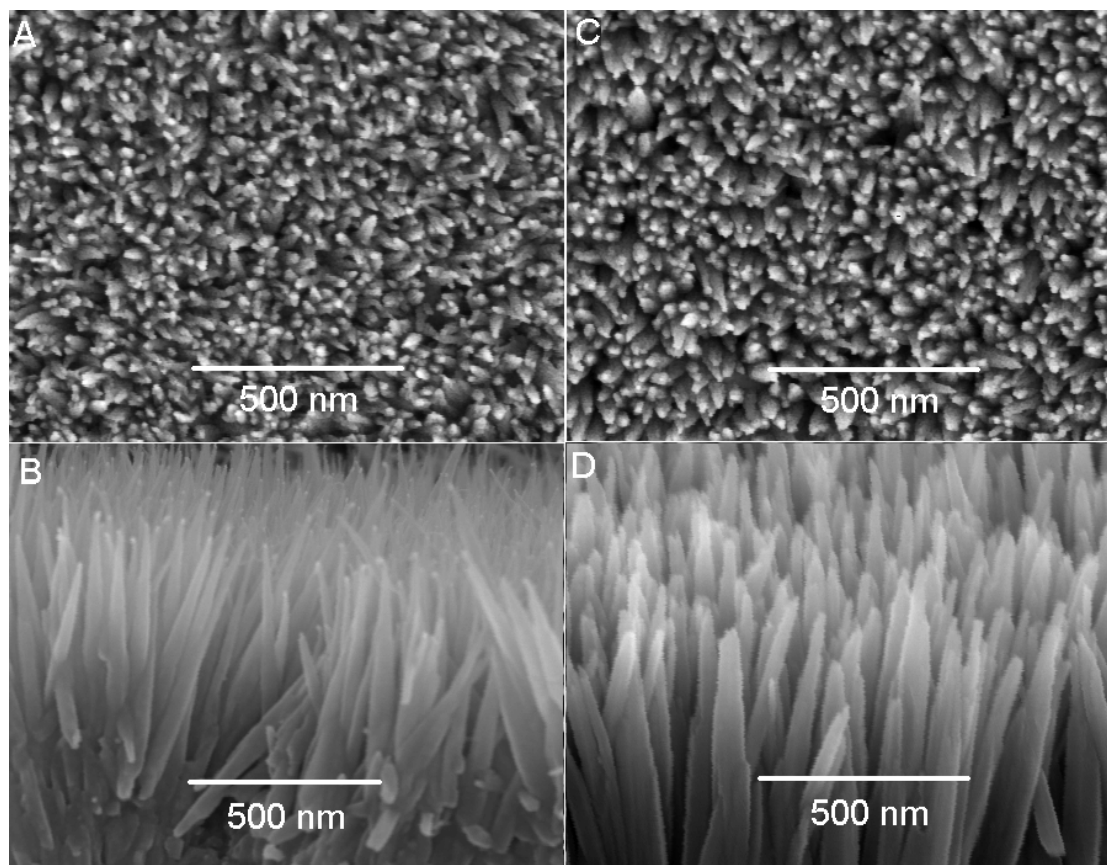
**Figure S2.** A Large scale SEM(A) and XRD(B) pattern of ZnO nanoneedles array (20  $^{\circ}\text{C}$ , 12 h) after sonication in potassium hydroxide aqueous solution for 5 second.  $\text{Zn}(\text{OH})_2$  nanocrystal can be removed thoroughly.



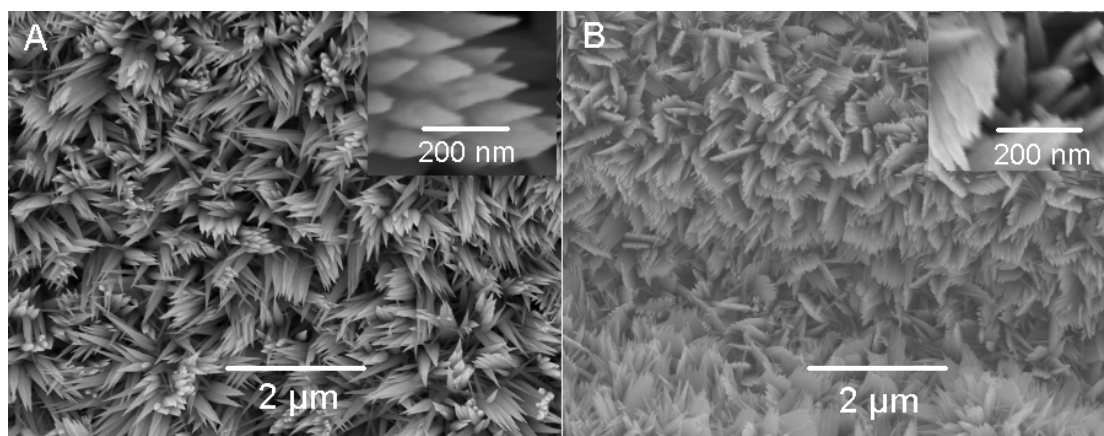
**Figure S3.** A large area view of as-prepared nanorods array generated at 30  $^{\circ}\text{C}$  for 12h.



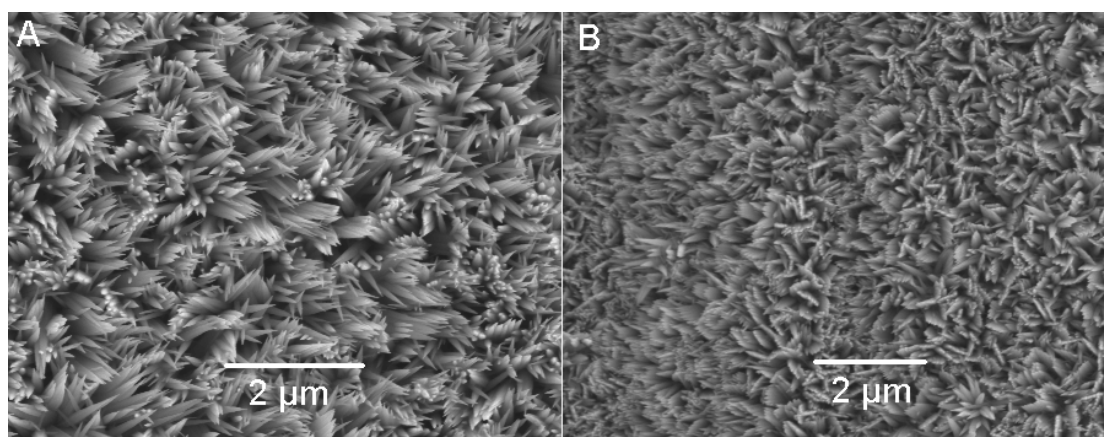
**Figure S4.** Room-temperature photoluminescence spectrum of as-prepared ZnO nanoneedles array. (20 °C, 12 h)



**Figure S5.** SEM images of the zinc foil surfaces after reaction in an alkali zincate solution at different temperature and for different time. A) 20 °C□15 min; B) 20 °C□300 min; C) 30 °C□15 min; D) 30 °C□300 min.



**Figure S6.** SEM images of a zinc foil freshly pretreated by two different methods after reaction at 20 °C for 5 h. A) reacted with 1 M HCl for 5 min; B) polished with an abrasive paper (1200 mesh). Insert: magnified views.



**Figure S7.** SEM images of a zinc foil freshly pretreated by two different methods after reaction at 30 °C for 5 h. A) treated with 1 M HCl for 5 min; B) polished with an abrasive paper (1200 mesh).