

Electronic Supplementary Information

Synthesis of Large-Scale Periodic ZnO Nanorod Arrays and Its Blue-Shift of UV Luminescence

Xiaoxian Zhang^a, Dongfang Liu^b, Lihuan Zhang^a, Wenliang Li^a, Min Gao^a, Wenjun Ma^b, Yan Ren^b, Qingsheng Zeng^a, Zhiqiang Niu^b, Weiya Zhou^b and Sishen Xie^{*ab}

a Key Laboratory for the Physics and Chemistry of Nanodevices and Department of Electronics, Peking University, Beijing 100871, People's Republic of China

b Institute of Physics, Chinese Academy of Sciences, Beijing 100080, People's Republic of China

Fax: +86-10-82649531; Tel: +86-10-82649081; E-mail: ssxie@aphy.iphy.ac.cn

Figure S1 presents the SEM images of the Au particle pattern obtained after different time of oxygen plasma etching. We take products based on 600 nm PS nanosphere as an example. The sizes of the Au particles are 300 nm down to 60 nm for 5 min to 2 min oxygen plasma etching. Different from our former work, longer the etching time is, bigger the size of Au particle is. It is because of the heating effect of oxygen plasma. In the former work, the PS sphere used was relatively large, and deformation of PS sphere was neglectable in a short heating time. Therefore, the size of Au particle is mainly due to the size of PS nanosphere reduced by oxygen plasma etching. However, when the size of PS sphere become smaller, this effect was obvious. The longer the etching time is; the larger the deformation of nanosphere is. Thus, opposite phenomena were observed in Figure S1.

Figure S2 shows temperature dependent spectra of ZnO nanorods with the diameter of 180 nm. One can see that it has the similar optical property as Figures 8c and 8d. Notice that a peak around D^0X (We denote it as BX) does not vanish with the increasing temperature (can trace up to 200 K). It seems that this peak can be attributed to biexciton. We suggest that the presence of BX can contribute to the high energy part of NBE emission and induce further blue-shift as well as decrease of phonon-exciton interaction.

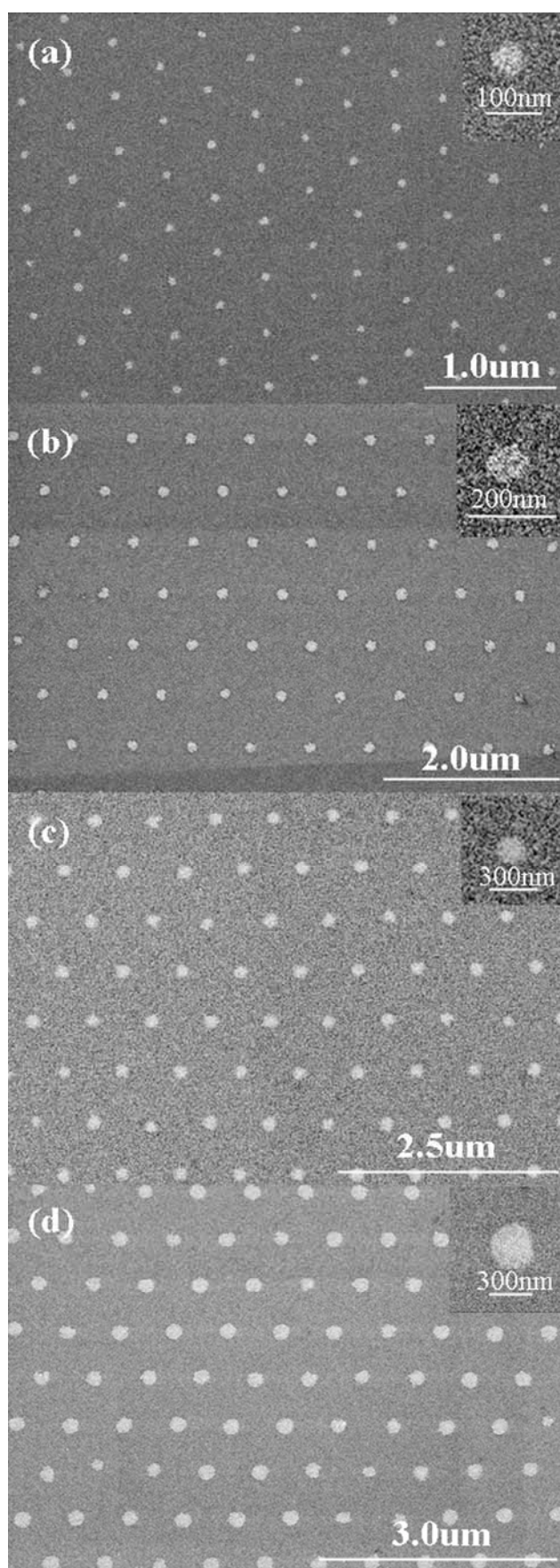


Fig. S1 Tune the sizes of catalyst (Au) particles by the time of oxygen plasma etching while the heating time on a hotplate (Stuart, CB500) at 100 °C was kept 15 s. Figure S2a-d are the SEM images of the Au particle patterns obtained after oxygen plasma etching for 2 min, 3 min, 4 min and 5 min respectively. Inset shows the size of Au particle obtained, and the size of Au particle was about 60 nm, 100 nm, 200 nm and 300 nm respectively.

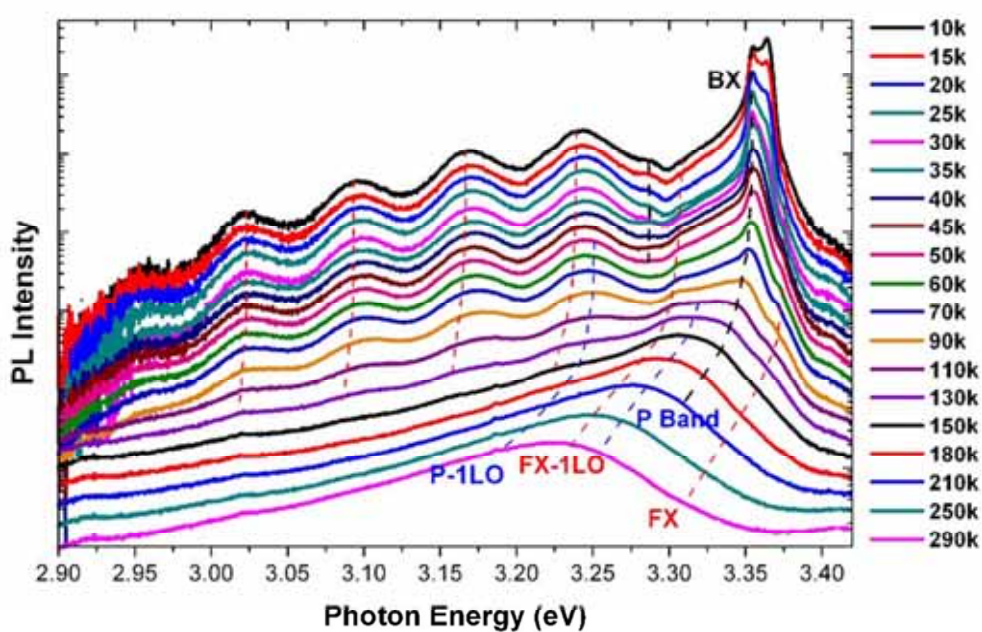


Fig. S2 Temperature dependent spectra of ZnO nanorods (the diameter is about 180 nm).