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# Supporting Information

## ZnO nanorod arrays grown on AlN buffer layer and their enhanced Ultraviolet emission

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Reaction conditions

For hydrothermal process, equimolar concentration (0.1 mol/L) zinc acetate ($Zn(CH_3COO)_2 \cdot 2H_2O$) and hexamethylenetetramine ($C_6H_{12}N_4$) were mixed at a volume ratio of 1:1 under mild magnetic stirring for 15 min as a precursor solution (40 ml). Then the solution was transferred into the Teflon-lined stainless steel autoclave. The mixture was performed in a hot air oven at 95°C for 6 h. After the oven cooled to room temperature, the samples were taken out followed by rinsing and drying.

ZnO NRs with different reactant concentration

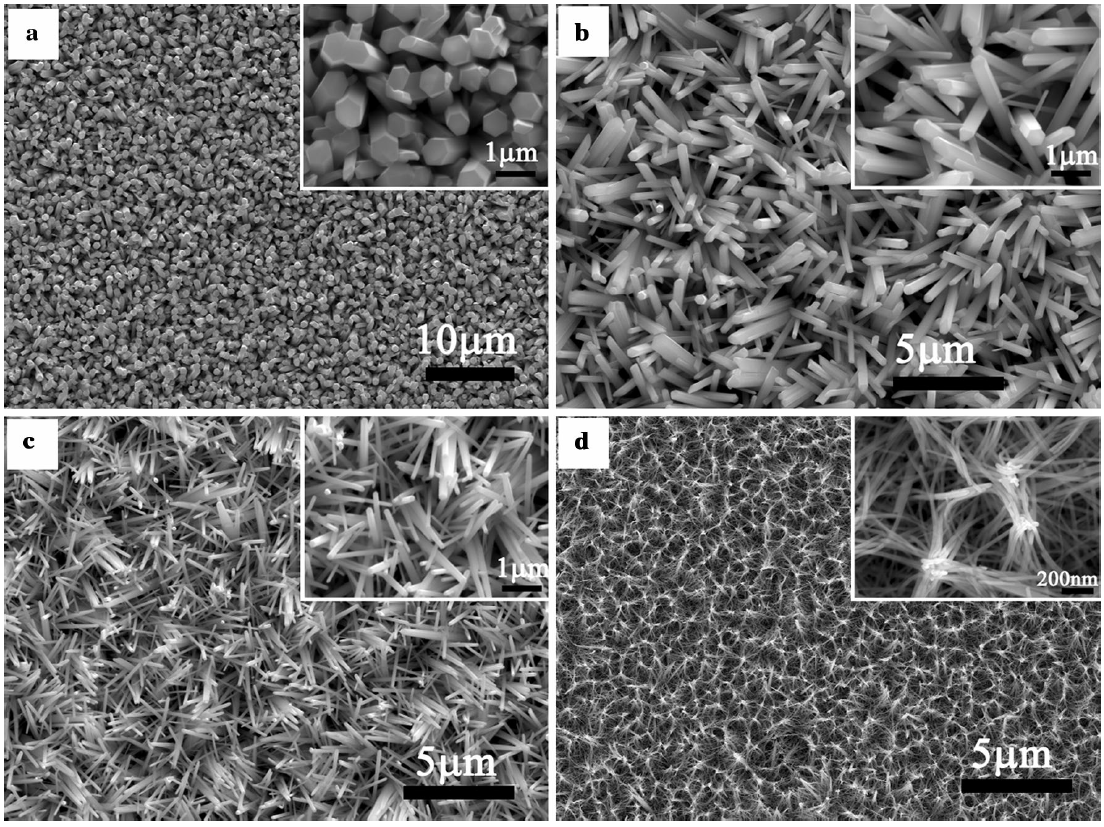


Fig. S1 SEM images and high-magnification images (the inset) of the synthesized ZnO NRs with different reactant concentration: a 0.1, b 0.05, c 0.025, and d 0.01 mol/L

When the reactant concentration was 0.1 mol/L, the ZnO nanorods exhibited the smooth regular hexagonal top facets with an average diameter of about 600 nm and bonded tightly together (shown in Fig.S1a). As the concentration was decreased to 0.05 mol/L, Fig. S1b shows decrease in the diameter of ZnO nanorods and increase in the space between the nanorods. When the reactant concentration was decreased to 0.025 mol/L, the diameter of ZnO nanorods decreases continuously to 100 nm while obvious change is found for nanorod density in Fig. S1c. With the further decrease of reactant concentration to 0.01 mol/L, the ZnO nanorods with diameter of 20 nm were formed, and the array density continued to increase (shown in Fig. S1d). Since ZnO nanorods are too thin to be individually stood, they became to be inclined and intertwined with

each other and a reticular structure forms, herein that the gap distance between NRs was increased.

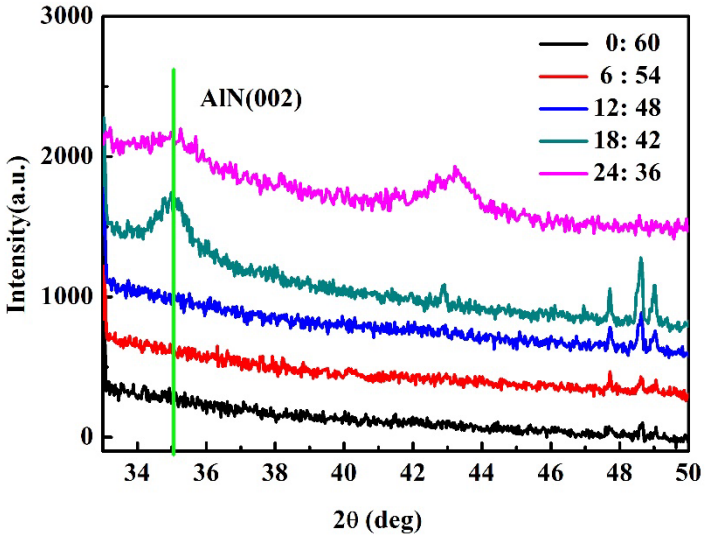


Fig. S2 The X-ray diffraction (XRD) plot of AlN films grown with various $Ar/N_2$ ratio

Figture S2. Show the AlN films grown with various $Ar/N_2$ ratio, when the ratio are 0:60, 6:54, 12:48, there are no AlN related peaks. As the ratio change to 18:42 and 24:36, the AlN (002) diffraction peak emerge at 35.7°. Since the sample grown with an $Ar/N_2$ ratio of 18:42 has the narrower full width at half maximum (FWHM) value compare to 24:36, so we chose 18:42.