Supplementary Information

Evidences for carbon-nitrogen complex in ZnO nanostructures with

very high nitrogen doping

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I. N1s core level XPS spectrum of pure ZnO nanowires

Pure ZnO nanowires (no N_2O in synthesis) is grown and characterized by XPS for comparison. No nitrogen signal is distinguishable in the N1s core level spectrum.



Fig. S1 XPS N1s core level spectra of N-doped ZnO nanowires (with N₂O in synthesis) and pure ZnO nnaowires (without N₂O in synthesis).

II. Effect of annealing on carbon-nitrogen complex in ZnO nanostructures

The as-grown ZnO nanowires and submicro-columns were post-treated by rapid thermal annealing at 900°C for 1-15 min. The XPS N1s core level spectra are shown in Figure S2. For both nanowires and submicro-columns, the nitrogen content decreases drastically after 1min annealing, and become undetectable after 15 min

annealing. The results indicate that the carbon-nitrogen complex in our samples is not stable at high temperature.



Figure S2. XPS N1s core level spectra of ZnO nanowires (left) and submicro-columns (right) annealed at 900°C for 1 and 15 min.