Supporting information

The GaP was nitrided at temperatures of 873, 973, 1023, 1073, and 1123K. The flow rate of NH_3 was 300 mL min^{-1} and nitridation time was 3 h. The diffraction patterns of the samples after nitridation were nearly the same as that of GaP before nitridation except for the appearance of a very small peak due to GaN. Fig. S1 shows the main X-ray diffraction peak of GaP in the region 2θ=28 - 29° nitrided at various temperatures. No significant shifts of the peak by nitridation were observed.

Fig. S2 shows the SEM images of ZnO/GaN and ZnO/GaN-P(823, 0.07). Both powders have similar small particles-aggregated irregular forms. Neither the improvement of crystalline nor the preferable growth of specific planes was observed. There were little changes in the morphology of the photocatalysts.

Fig. S3 shows a plot of P/(N+P)x100 % against the shifts of diffraction peak from GaP for a cluster model of $Ga_{32}P_{32-y}N_y$(y=1~8). With increasing N content, the diffraction angle caused a linear shift to higher diffraction angles. The diffraction angle shifts that provide the higher photocatalytic activity were in the range of 2θ=0.20~0.44°, as shown in Fig. 8 in the paper. The linear relation of Fig. S3 shows that the shifts are induced with 92.6 ~96.6% of P , that is, 3.4~7.4% involvement of N.

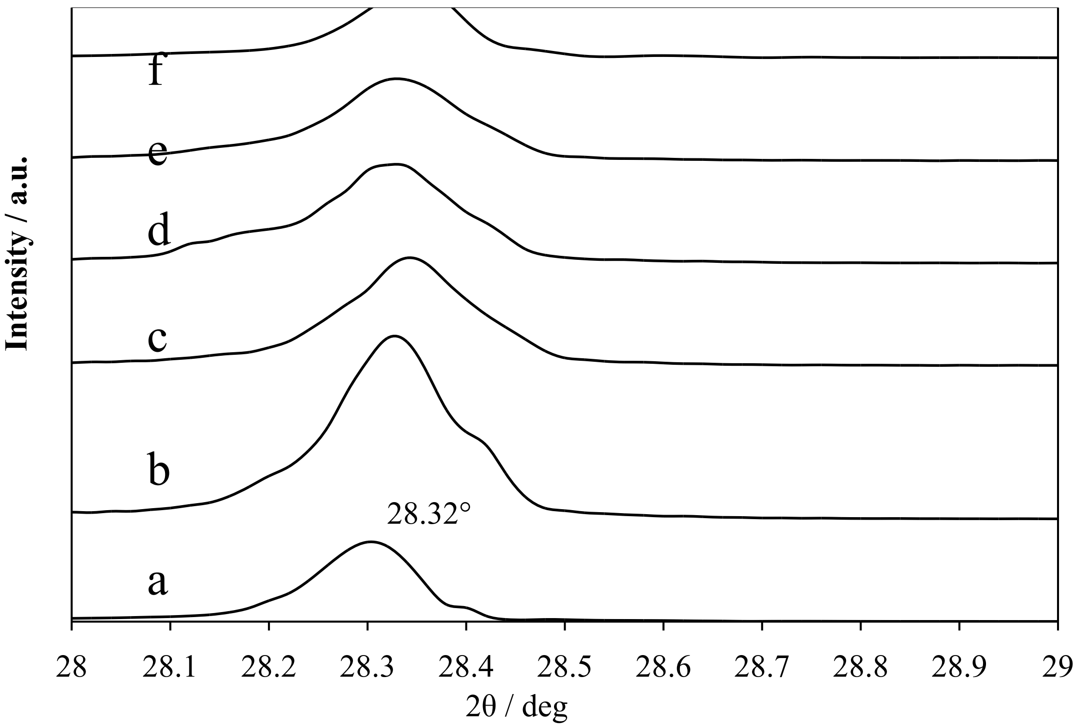

Fig. S1 X-ray diffraction peaks of GaP(a) in the region 2θ=28 - 29°and the peaks after nitridation of GaP at various temperatures of 873(b),973(c), 1023(d), 1073(e) and 1123K(f).

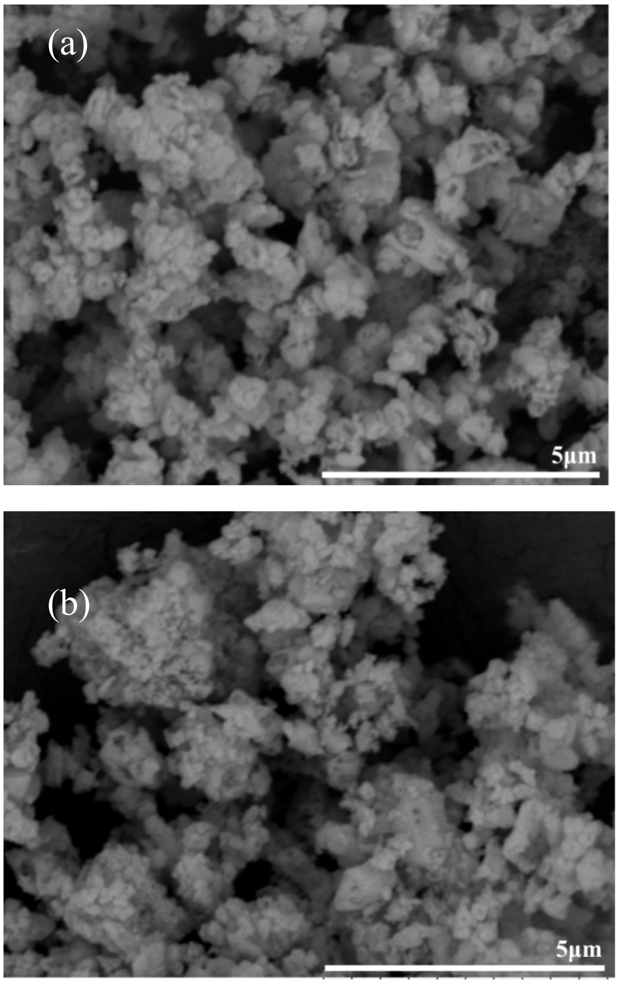

Fig. S2. SEM images of ZnO/GaN ((a)) and ZnO/GaN-P (823, 0.7)((b)).

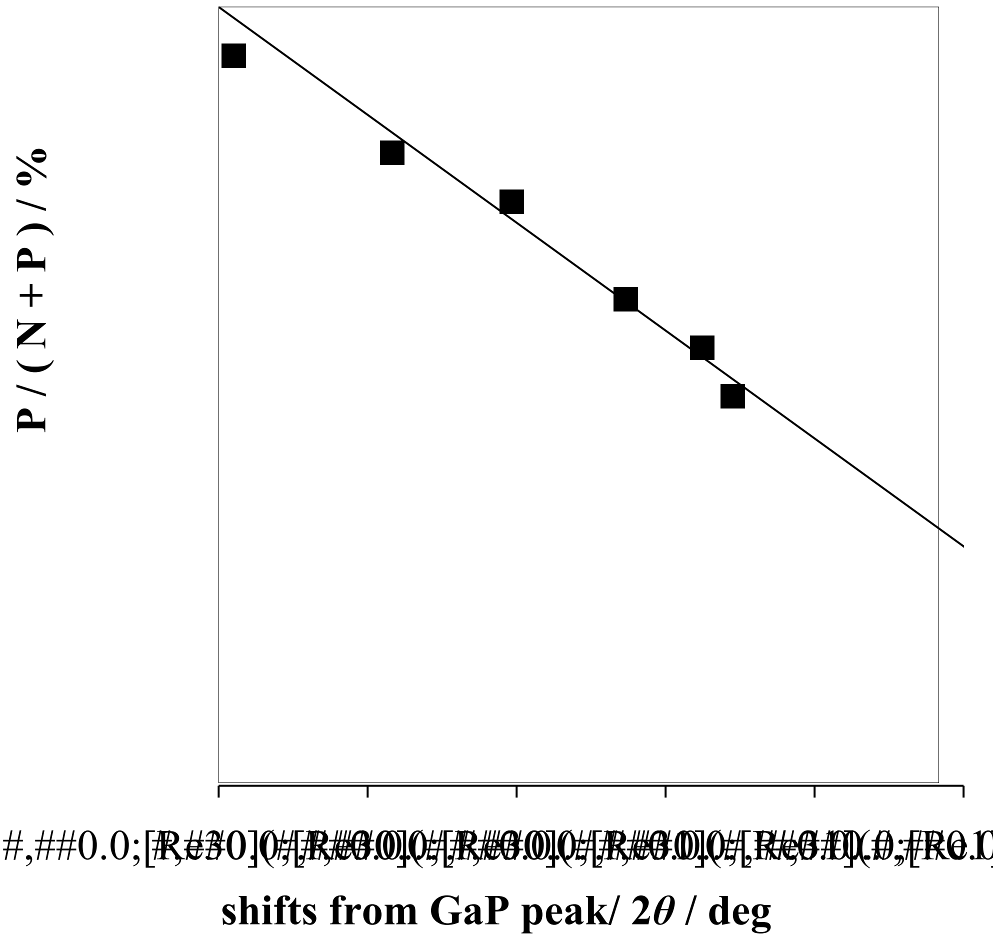

Fig. S3. Plots of P/(N+P)x100 vs. shifts of diffraction peak from GaP. Cluster model for $Ga_{32}P_{32-x}N_x$(x=1~8).