

Supplementary material

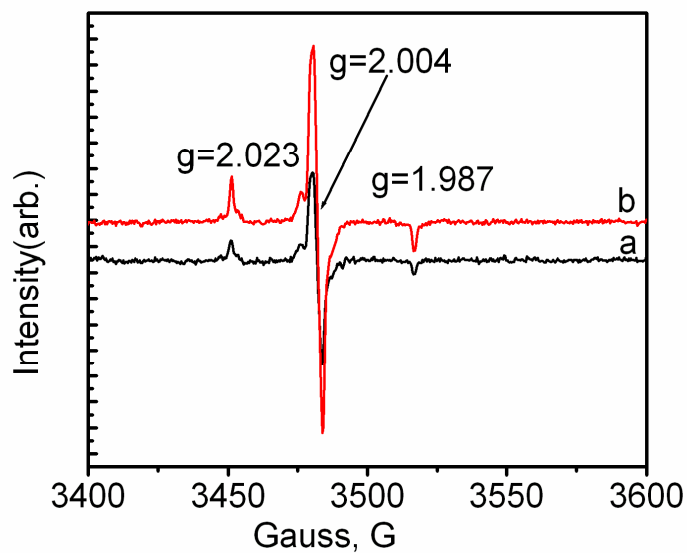


Fig.1 ESR spectra of N-P25(600) and N-P25(700) prepared by treating P25-TiO₂ in an NH₃ flow for 4h at 600°C and 700 °C, respectively.(a: N-P25(600); b: N-P25(700))

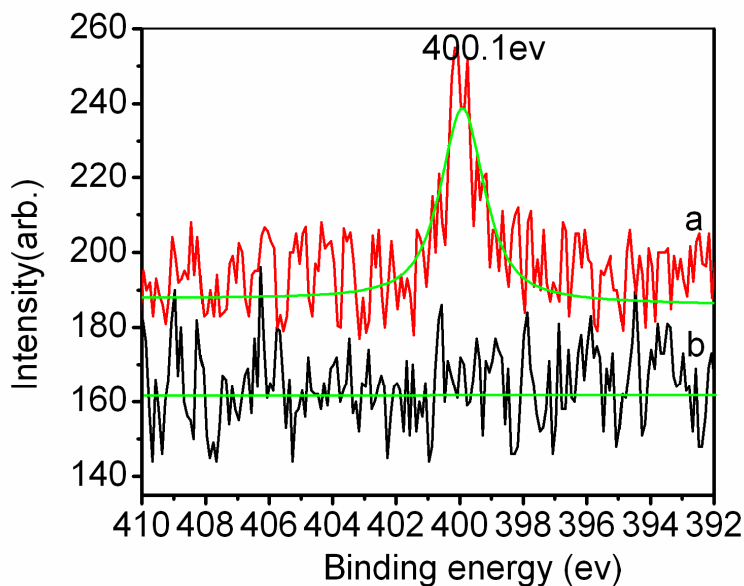


Fig.2 XPS spectra of N-P25(600) and N-P25(700) prepared by treating P25-TiO₂ in an NH₃ flow for 4h at 600 °C and 700 °C, respectively.(a: N-P25(600); b: N-P25(700))

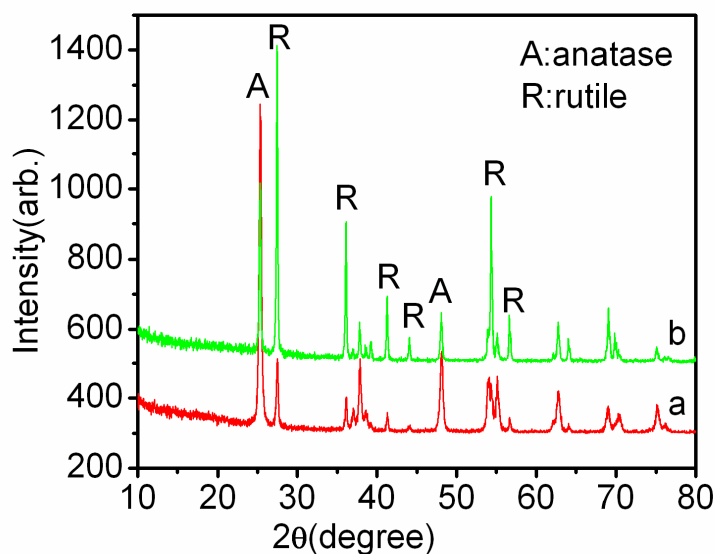


Fig.3 XRD spectra of N-P25(600) and N-P25(700) prepared by treating P25-TiO₂ in an NH₃ flow for 4h at 600 °C and 700 °C, respectively.(a: N-P25(600); b: N-P25(700))

Fig.1a, b show the triplet ESR spectra of N-P25(600) and N-P25(700), both samples were prepared by treating P25-TiO₂ in an NH₃ flow for 4h at 600 °C and 700 °C, respectively. It can be seen that the peak intensity of the latter is even higher than that of the former, however, the N1s spectrum of N-P25(700) shows the absence of surface nitrogen(see Fig.2b). Why does N-P25(700) without doped nitrogen also show a triplet ESR signal? The crystalline form of N-P25(700) mainly belongs to rutile system(see Fig.3b). It is suggested that in the weak reducing NH₃ atmosphere, rutile TiO₂ cannot be doped by nitrogen, but can be reduced to form single-electron-trapped vacancies(V_o[•]) peak with $g=2.004$ at $T=700^{\circ}\text{C}$. What the polar molecules adsorbed on N-P25(700) play the role in inducing two weak ESR signal with $g=2.023, 1.987$? This issue is under investigating in our lab. Additionally, N-P25(700) does not show visible light photoactivity(see text), which may be resulted from the change of crystalline form of

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TiO₂ (i.e. anatase as the major phase for N-P25(600) in Fig. 3a; rutile as the major phase
for N-P25(700) in Fig. 3b).