Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Low temperature synthesis and mechanism of finely dispersed nanorod rutile titanium dioxide

Xinwei Jiang[ab], Feng Wang*[a], Gen Li[c], Lin Qi[a], Peng Liu[a], Yanfen Ding[a], Shimin Zhang[a], Mingshu Yang*[a]

[a] Beijing National Laboratory for Molecular Sciences, Key Laboratory of Engineering Plastics, Institute of Chemistry, Chinese Academy of Sciences, Beijing 100190, China

[b] University of Chinese Academy of Sciences, Beijing, 100049, P. R. China

[c] Department of Materials Science & Engineering, Beijing Institute of Fashion Technology, Beijing, 100029, China

Band gap E_g can be determined using the following equation.

$$\alpha=A(h\nu-E_g)^n/h\nu \quad (1)$$

α is absorption coefficient. A is a constant. hν is the energy of light and n is a constant depending on the nature of the electron transition.(*J. Alloys Compd.*, 2015, **632**, 326) Band gap E_g can be obtained from the plots of $(\alpha h\nu)^{1/2}$ versus hν as the intercept at $(\alpha h\nu)^{1/2}=0$ of the extrapolated linear part of the plot (as shown in Figure S9). The band gap values estimated were 3.10, 2.65 and 2.94 eV for pure TiO_2, Fe doping TiO_2 and Al doping TiO_2 respectively.

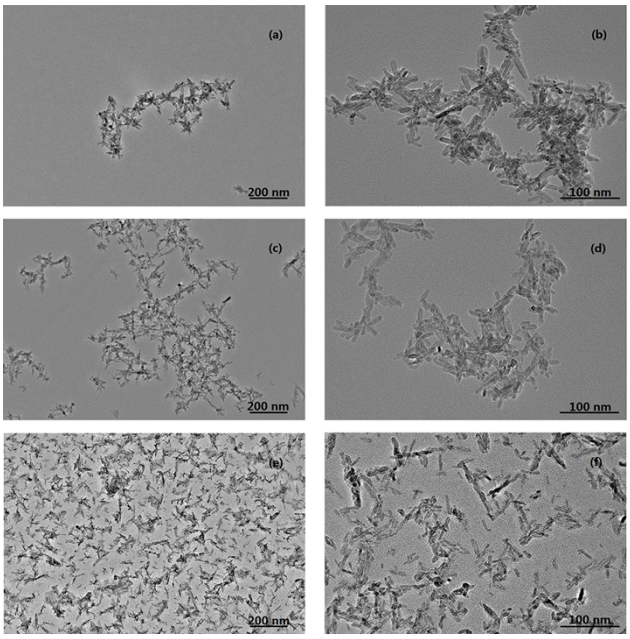

Figure S1. TEM images of Fe-0.1 (a, b), Fe-0.25 (c, d) and Fe-1 (e, f)

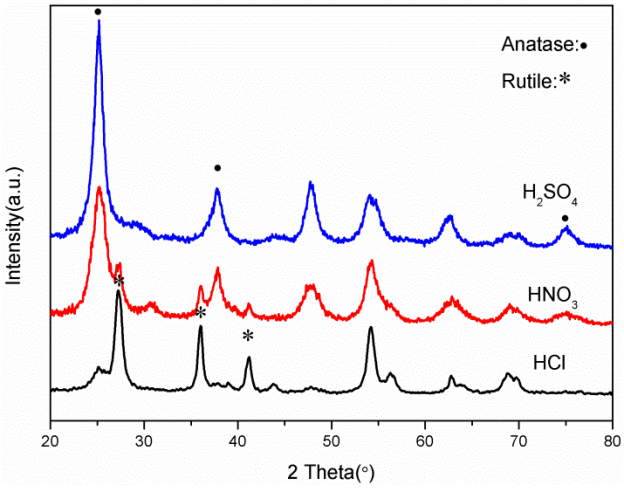

Figure S2. XRD patterns of TiO_2 prepared with different acids

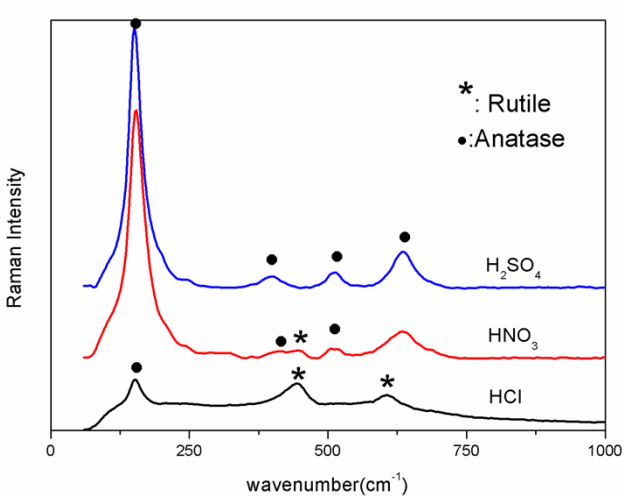

Figure S3. Raman spectra of TiO_2 prepared with different acids

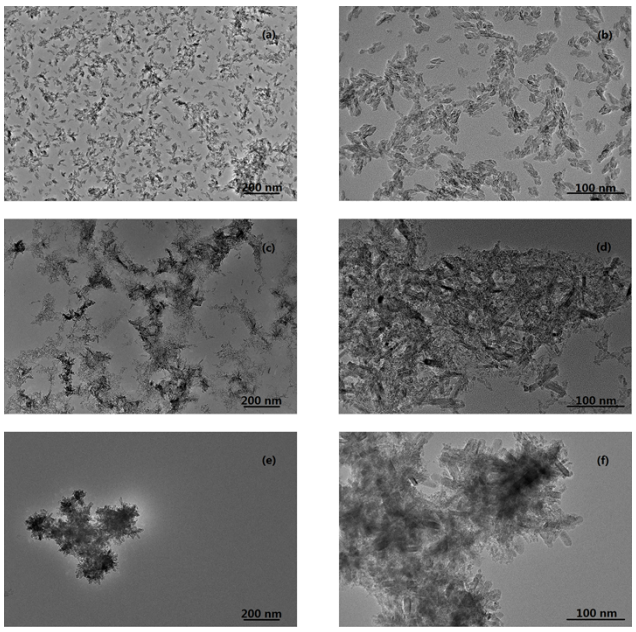

Figure S4. TEM images of TiO_2 prepared with H_2SO_4 (a, b), HNO_3 (c, d) and HCl (e, f)

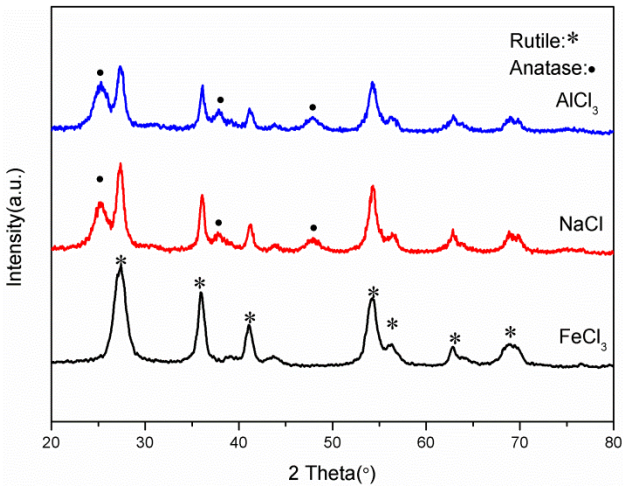

Figure S5. XRD patterns of TiO_2 prepared with different minerals

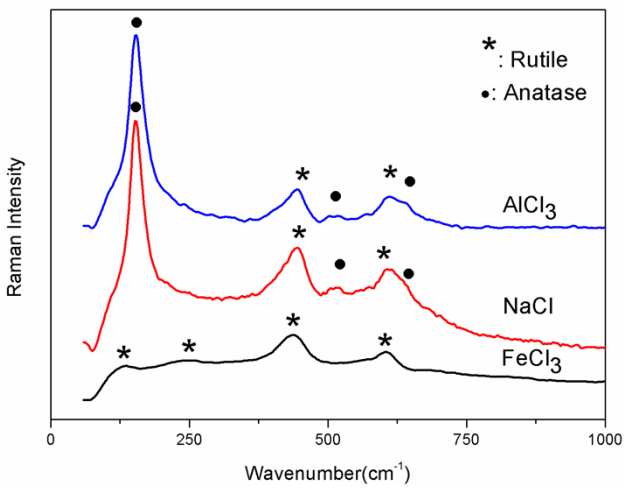

Figure S6. Raman spectra of TiO_2 prepared with different minerals

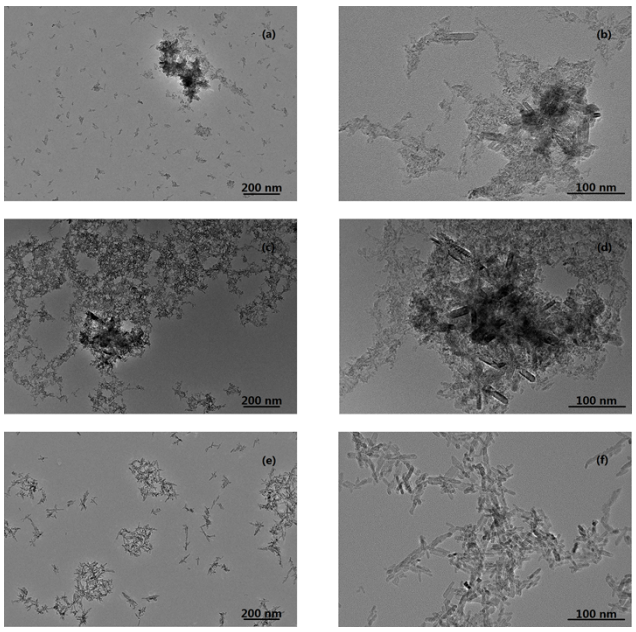

Figure S7. TEM images of TiO_2 prepared with NaCl (a, b), $AlCl_3$ (c, d) and $FeCl_3$ (e, f)

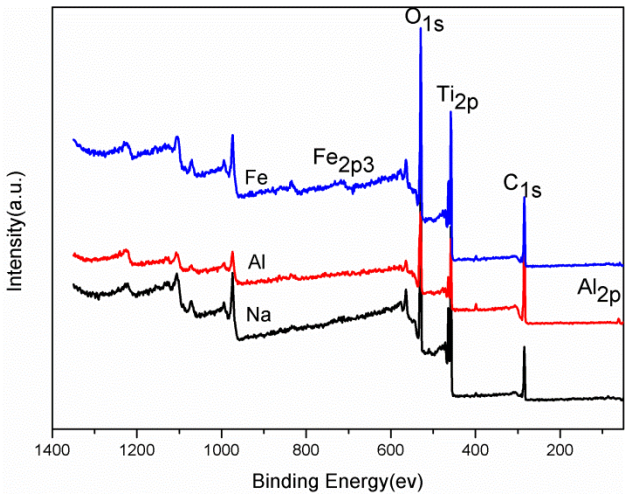

Figure S8. XPS analysis of TiO_2 prepared with different minerals

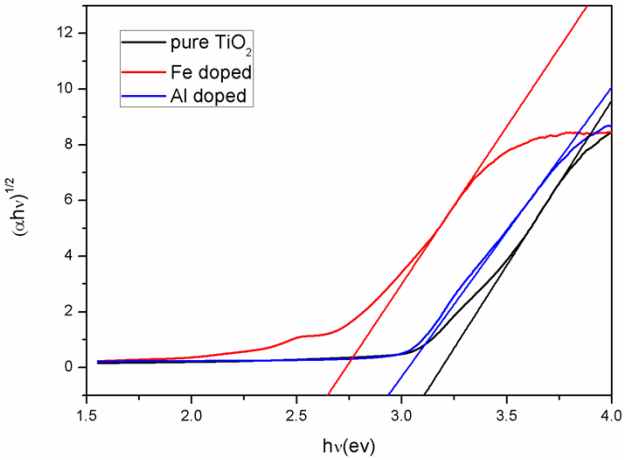

Figure S9. Band gap determination using $(\alpha h\nu)^{1/2}$ versus hν plots of pure TiO_2 and doping TiO_2

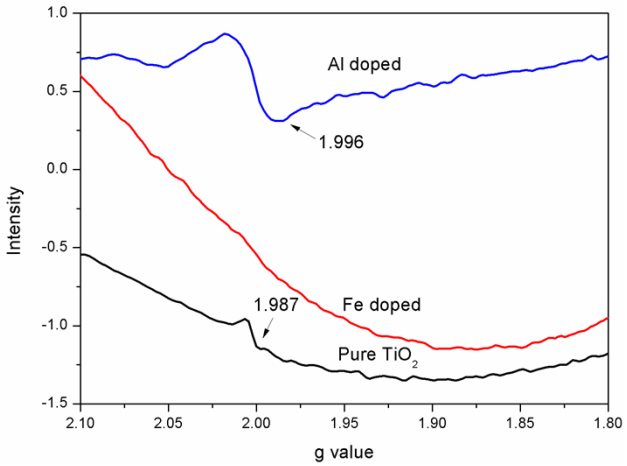

Figure S10. ESR spectra of pure TiO_2, Fe doping TiO_2 and Al doping TiO_2

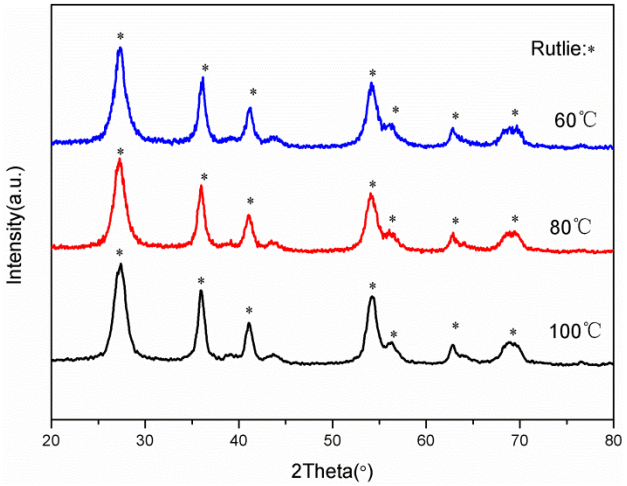

Figure S11. XRD patterns of TiO_2 prepared at different temperatures

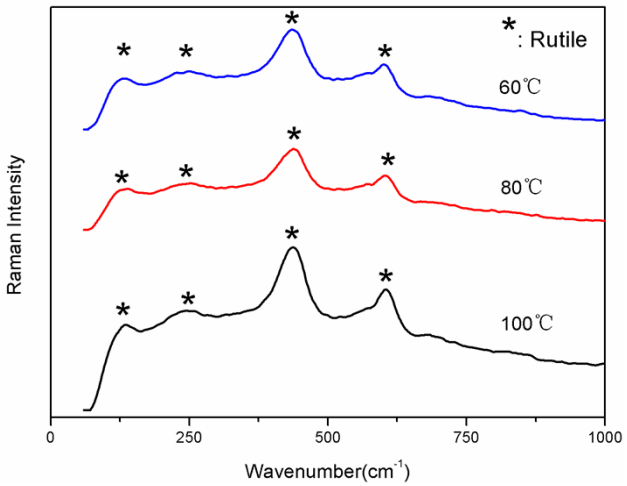

Figure S12. Raman spectra of TiO_2 prepared at different temperatures

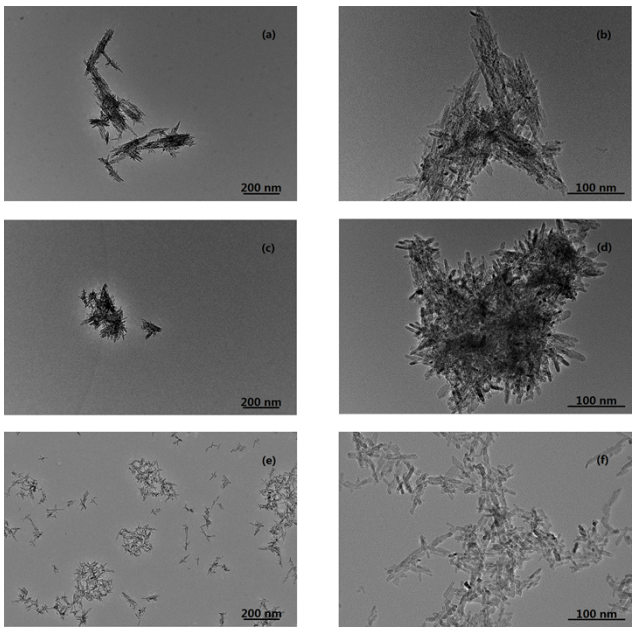

Figure S13. TEM of images of TiO_2 prepared at 60°C (a, b), 80°C (c, d) and 100°C (e, f)