Electronic supplementary information (ESI):

Mesoporous Ag/TiO_2 nanocomposites with greatly enhanced photocatalytic performance towards degradation of methyl orange under visible light

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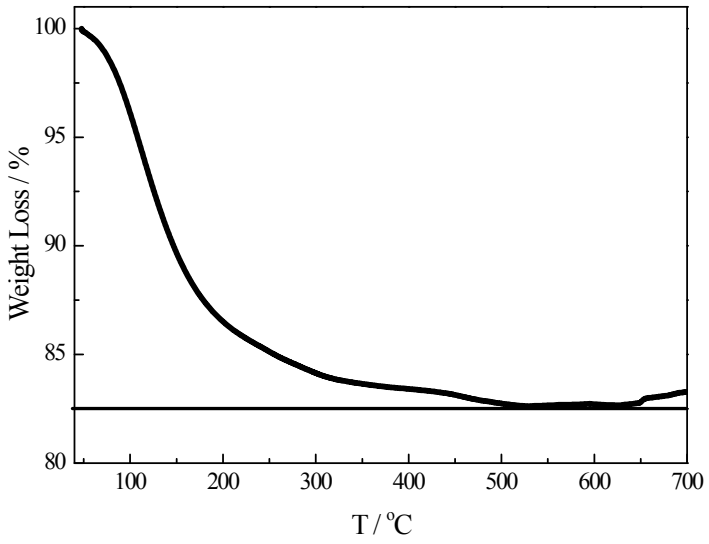

Fig. S1 Thermogravimetry behavior of H-titanate. TG curve exhibits a 18% weight loss after being heated to 700 °C in Ar.

The thermogravimetry behavior of the H-titanate samples was measured in Ar. Fig. S1 depicts a typical TG curve. A weight loss of ~18% is shown in the TG curve after being heated to 700 °C. The large weight loss indicates a large amount of H_2O in the samples, which is a evidence for H-titanate.[1, 2]

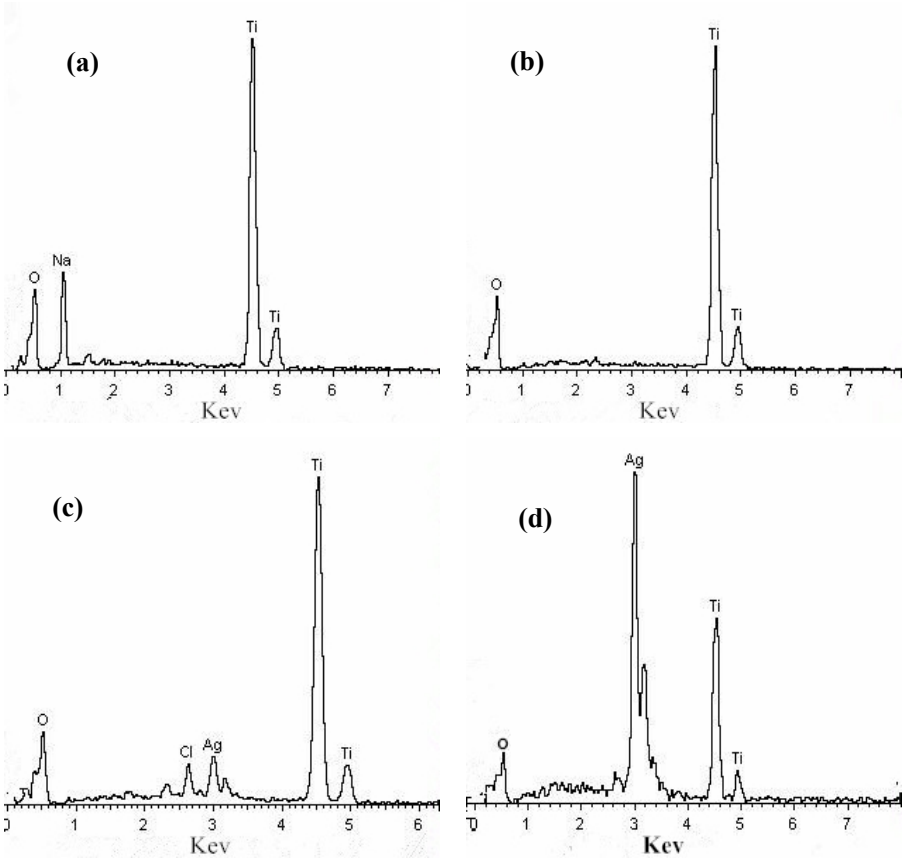

Fig. S2 The related EDS spectra of (a) Na-titanate, (b) H-titanate, (c) Ag/AgCl/H-titanate and (d) Ag/TiO_2. The Na-titanate and H-titanate were obtained by dealloying of the $Al_{97.1}Ti_{2.9}$ precursor and further acid treatment of the as-dealloyed samples, respectively. The anatase TiO_2 was prepared by calcination of the H-titanate at 400 ^oC. The Ag/AgCl/H-titanate was obtained by dealloying and further acid treatment of the $Al_{97.4}Ti_{2.4}Ag_{0.2}$ precursor. The Ag/TiO_2 was obtained by calcination of the Ag/AgCl/H-titanate at 400 ^oC.

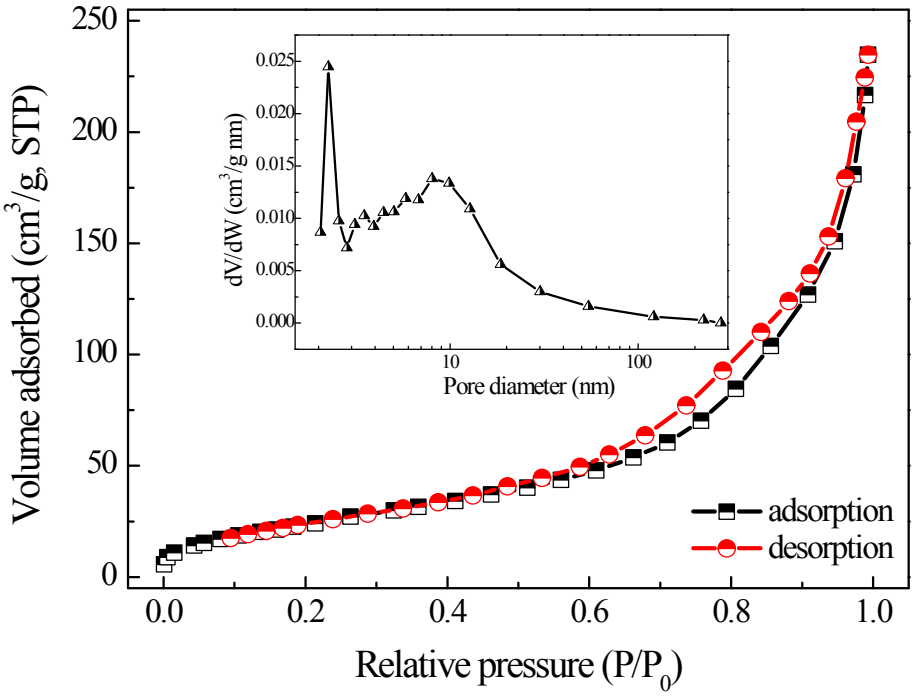

Fig. S3 Nitrogen adsorption-desorption isotherm and BJH pore size distribution curve (the insert) of the Ag/TiO_2 photocatalyst obtained by calcination of the Ag/AgCl/H-titanate at 400 °C.

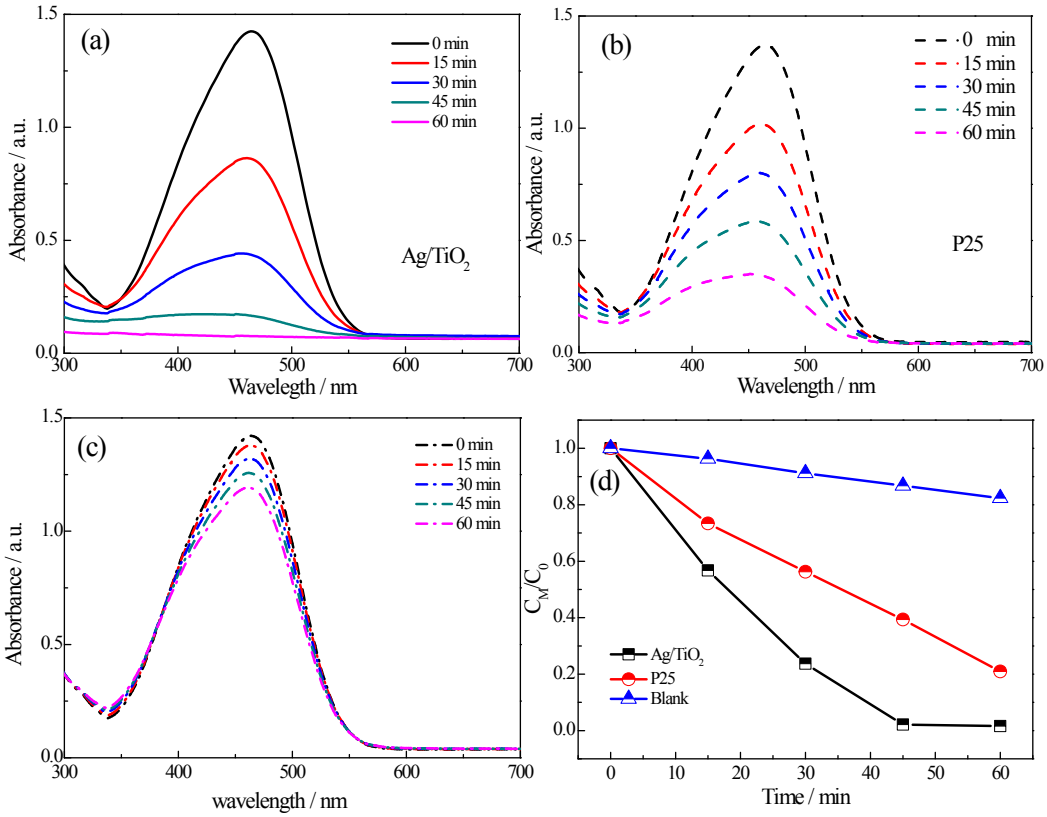

Fig. S4 (a, b and c) UV-vis absorption spectra of MO solution under different UV irradiation time in presence of (a) Ag/TiO_2, (b) P25 and (c) Blank. (c) Comparison of photocatalytic performance of different photocatalysts under the UV light irradiation.

As shown in Fig. S4 (a and b), the MO absorbance decreases obviously with increasing the UV light irradiation time. It is clear that the Ag/TiO_2 photocatalyst exhibits much better UV light photocatalytic performance than the commercial P25. Fig. S4(c) shows the blank test without catalysts under UV. Fig. S4(d) presents the MO degradation efficiency of the photocatalysts. The MO solution can be completely degraded in 45 min by the Ag/TiO_2. In comparison, the photodegradatoin ratio of the P25 is less than 80% even after UV irradiation of 60 min. Although the MO can be degraded without any catalysts, the degradation efficiency can be ignored.

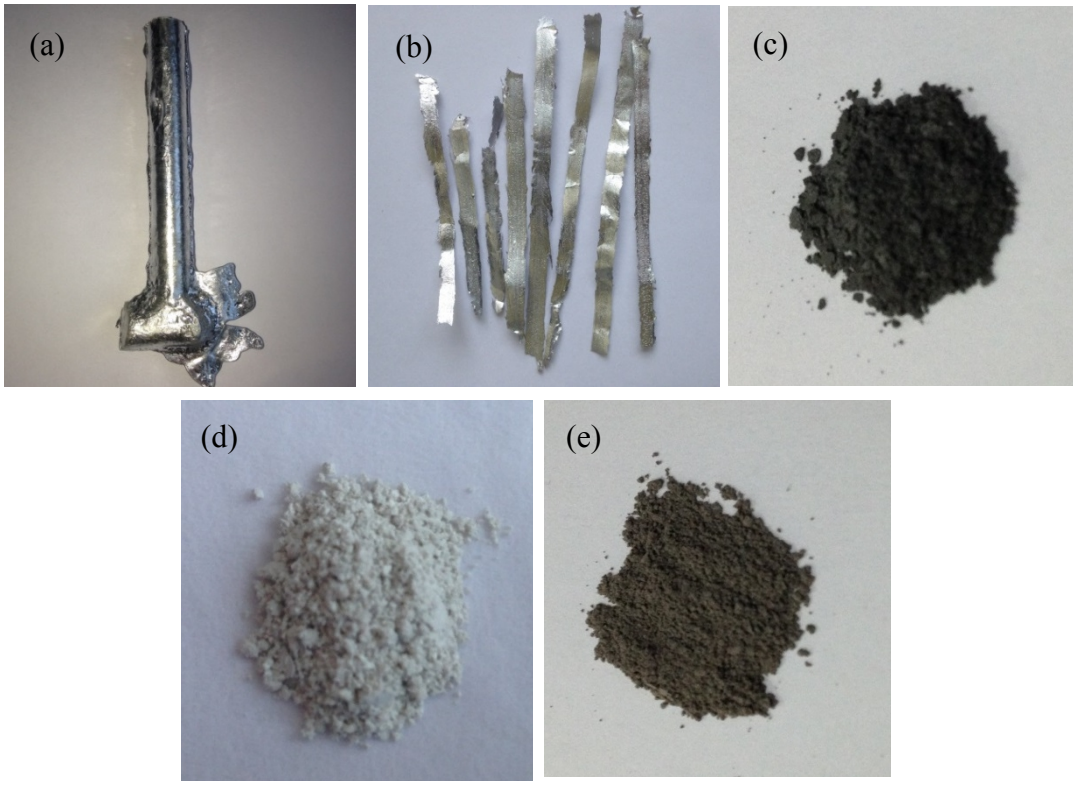

Fig. S5 The macro morphology and color of the samples with different treating methods. (a) a $Al_{97.4}Ti_{2.4}Ag_{0.2}$ alloy rod, (b) the Al-Ti-Ag alloy ribbions, (c) the as-dealloyed samples in NaOH solution, (d) the acid treatment samples in HCl solution and (e) the calcined samples at 400 ^{o}C.

The prepared samples at different steps are shown in Fig. S4. The liquid alloy was cast to the big alloy bars (Fig. S5(a)). In order to decrease the dealloying time, the alloy ribbons were prepared by the single roller melt spinning (Fig. S5(b)). Fig. S5(c) displays the black powders which was prepared by dealloying the Al-Ti-Ag ribbons in the NaOH solution. After acid treating in the HCl solution, the as-dealloyed powders transformed to the white powders due to the formation of the AgCl phase (Fig. S5(d)). At last step, the black powders were obtained by calcining the acid-treated powders at 400 ^{o}C (Fig. S5(e)).

References

1 T.P. Feist and P.K. Davis, *J. Solid State Chem.,* 1992, **101**, 275-295.

2 T. Sasaki, M. Watanabe, Y. Michiue, Y. Komatsu, F. Izumi and S. Takenouchi, *Chem. Mater.,* 1995, **7**, 1001-1007.