

From the UV-vis spectra the surface coverage,  $\Gamma$ , can be calculated by  $\Gamma = (N_A A_\lambda) / 2m\epsilon_\lambda$ , where  $N_A$  is Avogadro's constant,  $A_\lambda$  is the absorbance, and  $\epsilon_\lambda$  is the isotropic molar extinction coefficient at wavelength  $\lambda$ . The isotropic molar extinction coefficients are  $\epsilon_{245} = 1.63 \times 10^5 \text{ M}^{-1} \text{ cm}^{-2}$  for TALH and  $\epsilon_{223} = 8.07 \times 10^6 \text{ M}^{-1} \text{ cm}^{-2}$  for  $\text{P}_2\text{Mo}_{18}$ .

Hence, the amount of TALH is approximately  $2.64 \times 10^{-6}$  mol on the quartz slide with the size of  $4.0 \text{ cm} \times 2.5 \text{ cm}$ , namely, about  $2.11 \times 10^{-4}$  g titania will be obtained from T-n films. And about  $7.56 \times 10^{-9}$ ,  $1.51 \times 10^{-8}$  and  $2.26 \times 10^{-8}$  mol Mo atom respectively introduced into T-2, T-4 and T-6.

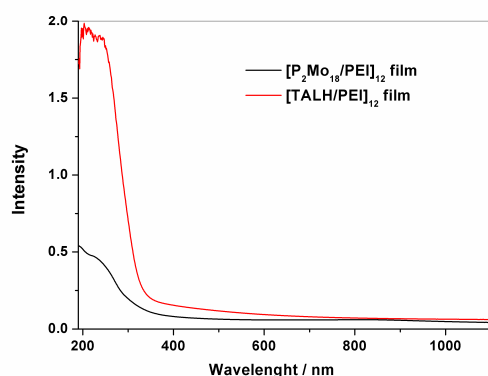


Fig. 1 UV-vis absorbance spectroscopy of pristine films without thermal treatment.

For a careful XPS analysis, the relatively quantitative analysis is performed according to the following equation:

$N_{E1} \cdot N_{E2} = (A_{E1}/S_{E1}) \cdot (A_{E2}/S_{E2})$ , where  $N$  is the atomic number,  $A_E$  is the XPS peak area of a kind of element,  $S$  is the elemental sensitivity factor. Thus, according to the elemental sensitivity factor of Ti2p and Mo3d as well as their corresponding XPS areas, the ratio of atomic number among Ti and Mo can be evaluated. And, utilizing the evaluated atomic number ratio, the percentage of SOV content can be calculated by the following formula:

$x = 100[1 - n_{OL}/(n_{Ti} \times 2 + n_{Mo} \times 3)]$ , where  $x$  is the percentage of SOV content,  $n$  is the atomic number.

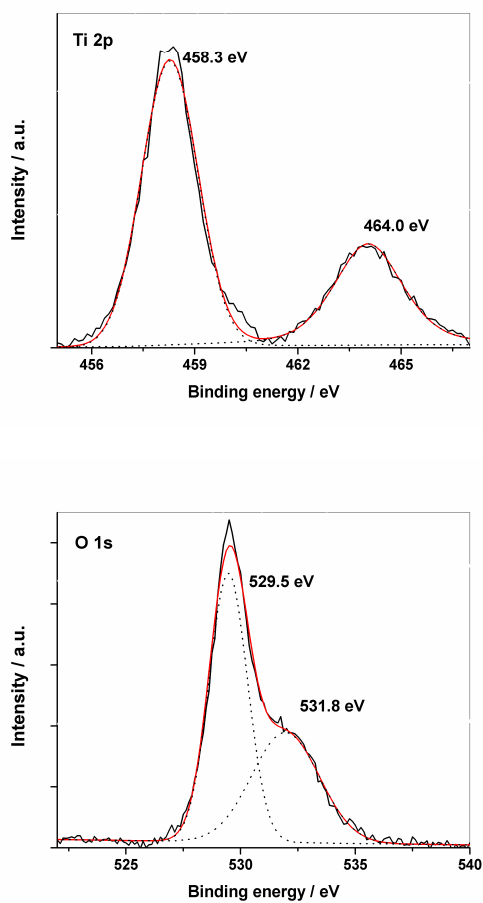


Fig. 2. XPS spectra of Ti 2p and O 1s in undoped TiO<sub>2</sub> films.

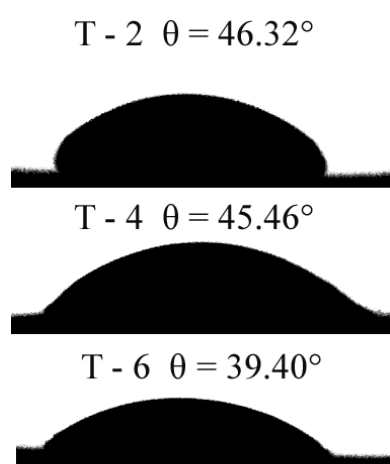


Fig.3 The water contact angles ( $\theta$ ) for T-2, T-4 and T-6 films respectively.

Photovoltage measurements were performed in an annular quartz photoreactor. The Mo-doped TiO<sub>2</sub> films were placed in the photoreactor and 150 ml of 0.02 M HNO<sub>3</sub> was added to it. Then, 35, 30, 25, 20 mL CH<sub>3</sub>COOH was added respectively. After degassing with purified N<sub>2</sub> for 30 min, 0.012 g of FeCl<sub>3</sub>·6H<sub>2</sub>O was added to the solution. The solution was again degassed for 15 min. The systems were irradiated with a 125 W UV lamp. The voltage developed at the working electrode against SCE was recorded with a multimeter.<sup>1,2</sup>

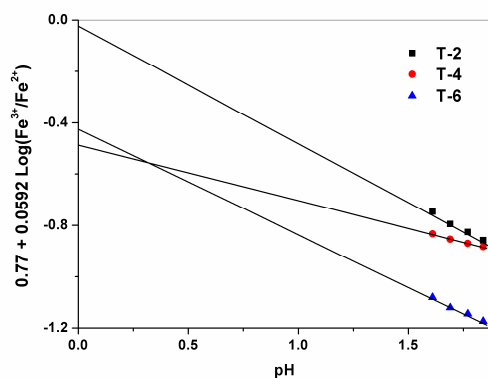


Fig. 4. Plot of  $0.77 + 0.0592 \log(\text{Fe}^{3+}/\text{Fe}^{2+})$  vs pH for T-2, 4, 6 films.

1 Roy, A. M.; De, G. C.; Sasmal, N.; Bhattacharyya, S. S. *Int. J. Hydrogen Energy* **1995**, *20*, 627-630.

2 Ward, M. D.; Bard, A. J. *J. Phys. Chem.* **1982**, *86*, 3599-3805.

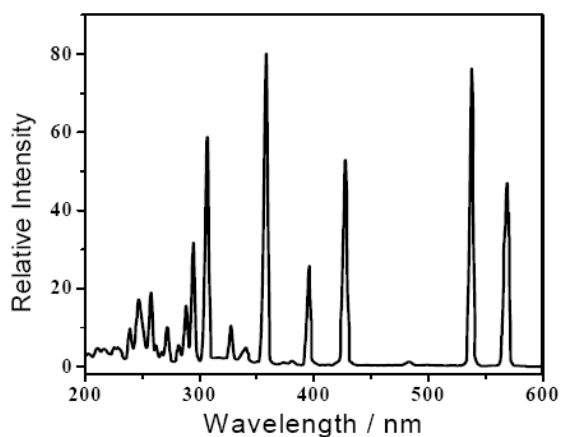


Fig. 5 Light spectrum of 125 W UV lamp which used as UV and visible light source.

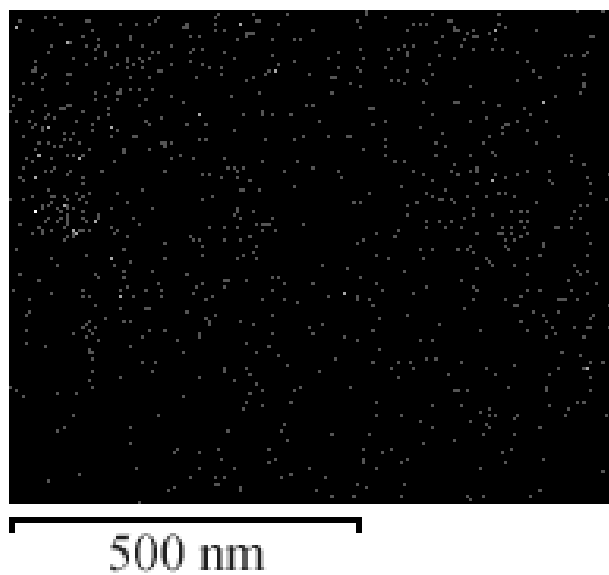


Fig. 6 EDX mapping for Mo element in the profile of T-2 films.