

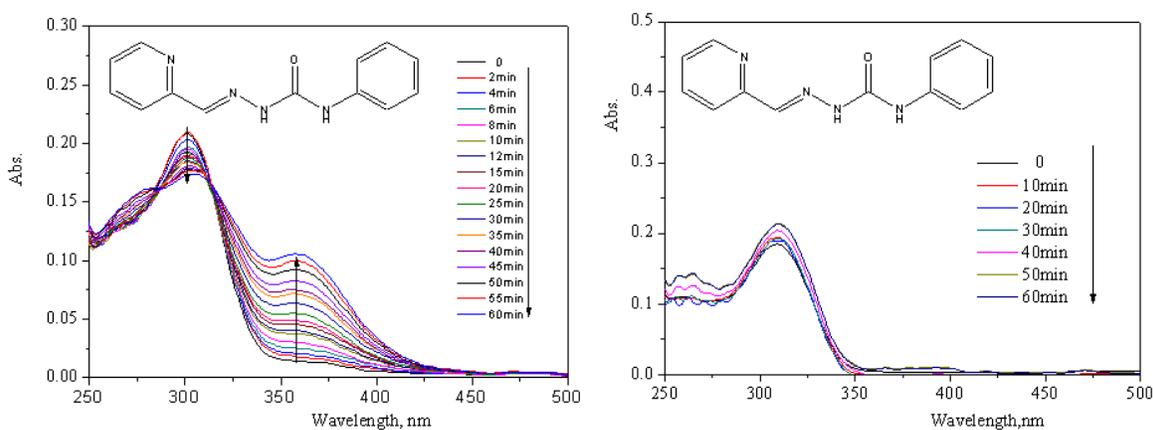
## Supplementary data

### Photochromism of (*E*)-4-phenyl-1-(pyridine-2-ylmethylene)semicarbazide

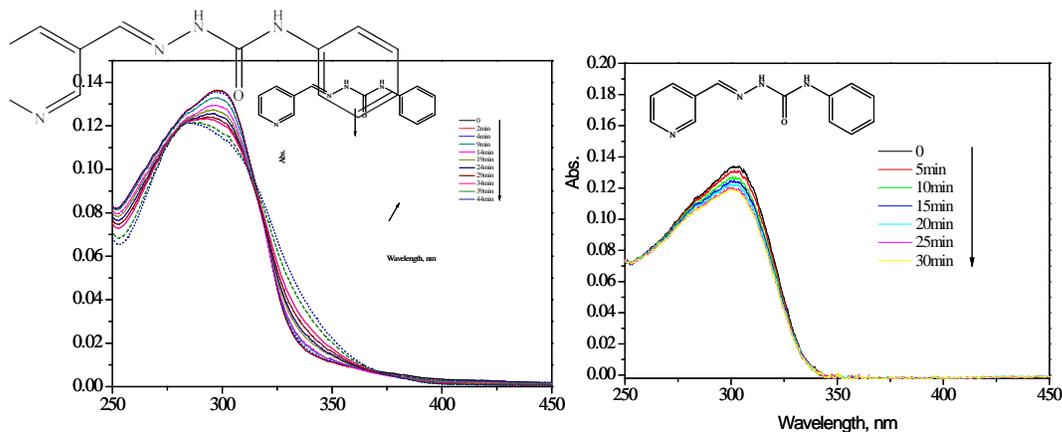
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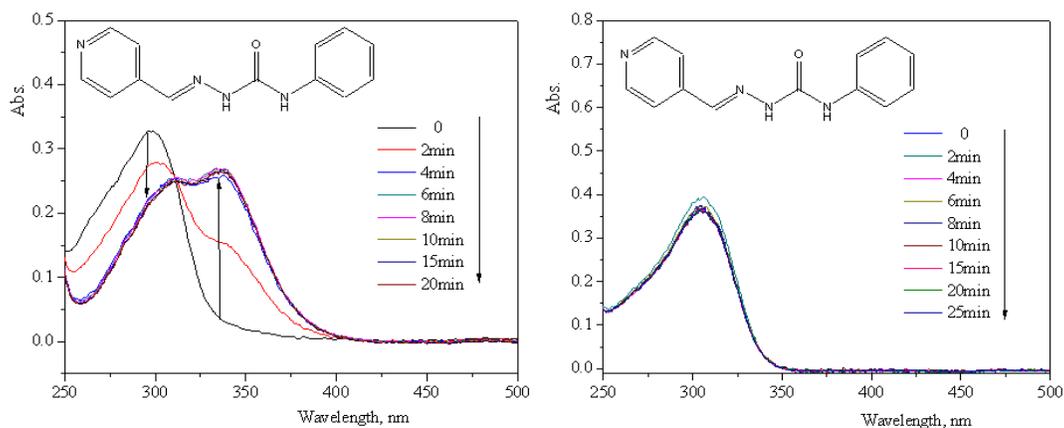
Corresponding author E-mail address: linlr@xmu.edu.cn



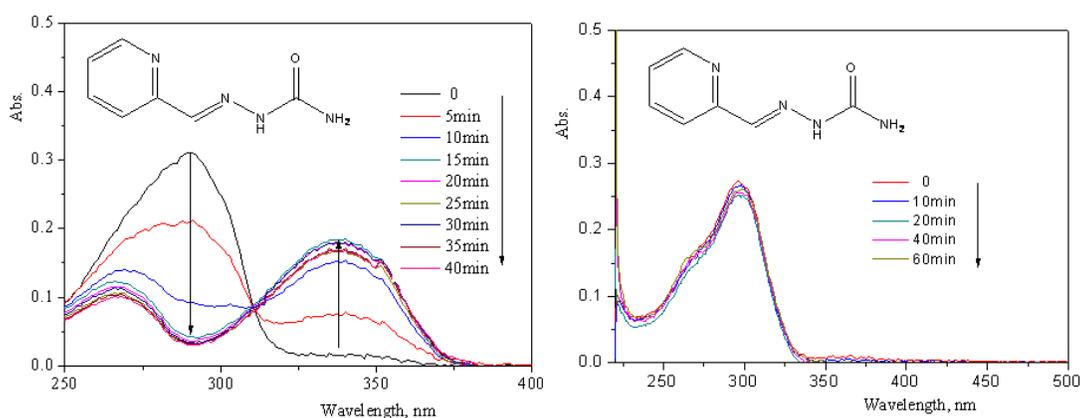
**Fig. S1.** Evolution of ultra-visible absorption spectra during the irradiation of **1** ( $1.0 \times 10^{-5} \text{ mol} \cdot \text{L}^{-1}$ ) compounds in dichloromethane (left) and ethanol (right) solutions respectively.



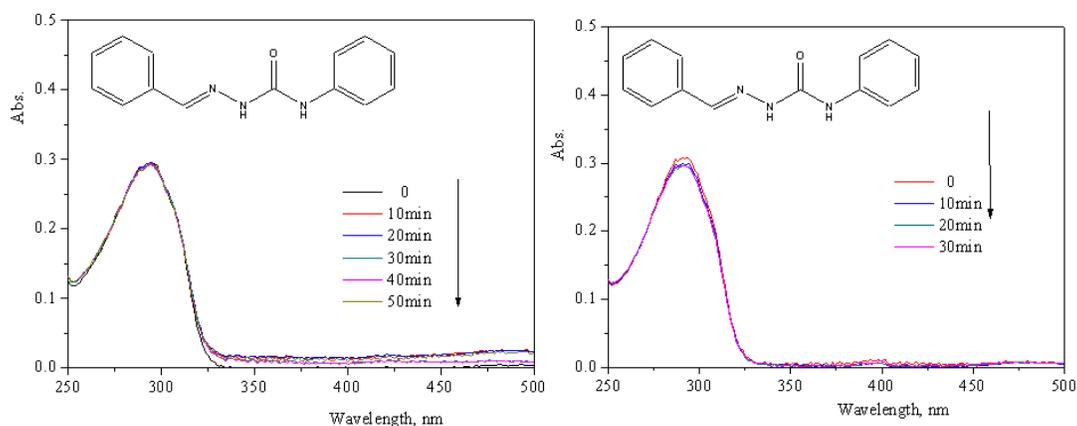
**Fig. S2.** Evolution of ultra-visible absorption spectra during the irradiation of **2** ( $1.0 \times 10^{-5} \text{ mol} \cdot \text{L}^{-1}$ ) compounds in dichloromethane (left) and ethanol (right) solutions respectively.



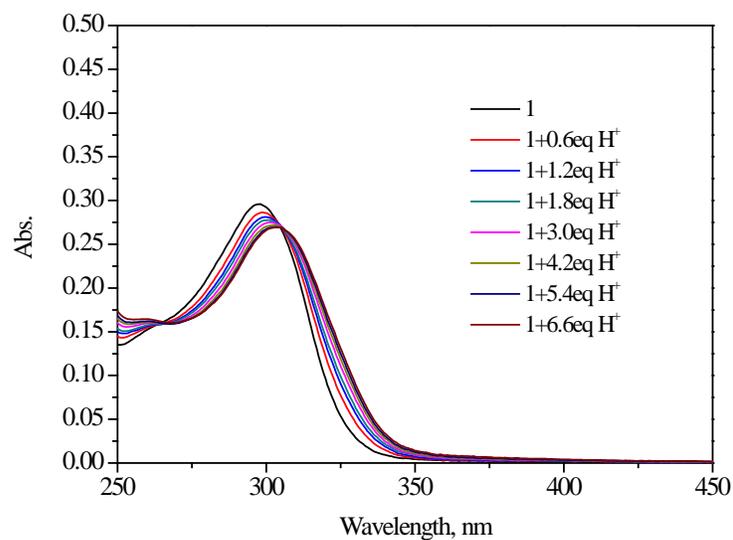
**Fig. S3.** Evolution of ultra-visible absorption spectra during the irradiation of **4** ( $1.0 \times 10^{-5} \text{ mol} \cdot \text{L}^{-1}$ ) compounds in dichloromethane (left) and ethanol (right) solutions respectively.



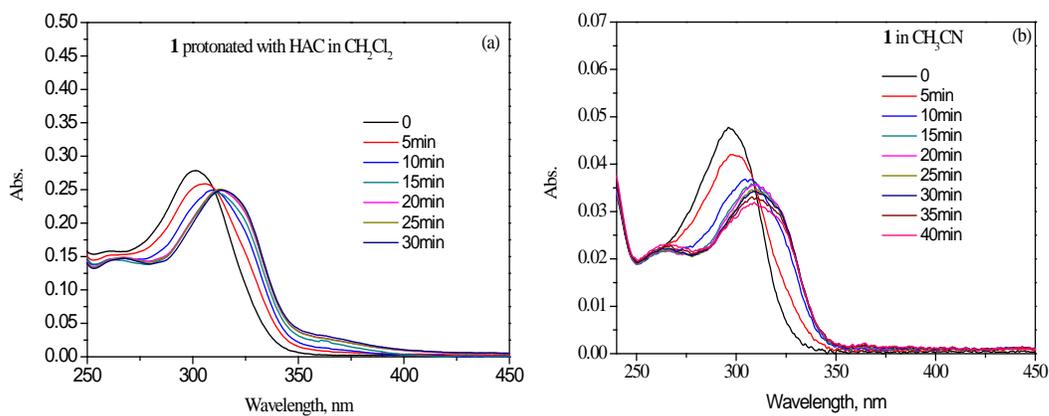
**Fig. S4.** Evolution of ultra-visible absorption spectra during the irradiation of **4** ( $1.0 \times 10^{-5} \text{ mol} \cdot \text{L}^{-1}$ ) compounds in dichloromethane (left) and ethanol (right) solutions respectively.



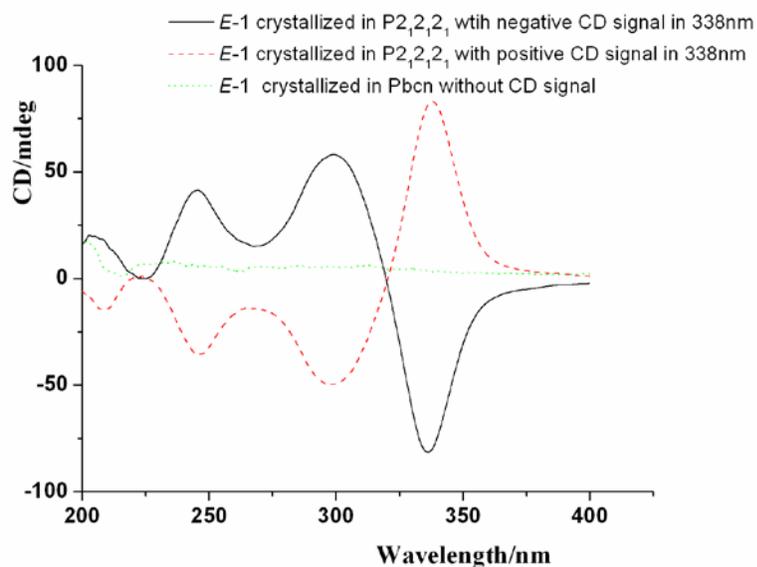
**Fig. S5.** Evolution of ultra-visible absorption spectra during the irradiation of **5** ( $1.0 \times 10^{-5} \text{ mol} \cdot \text{L}^{-1}$ ) compounds in dichloromethane (left) and ethanol (right) solutions respectively.



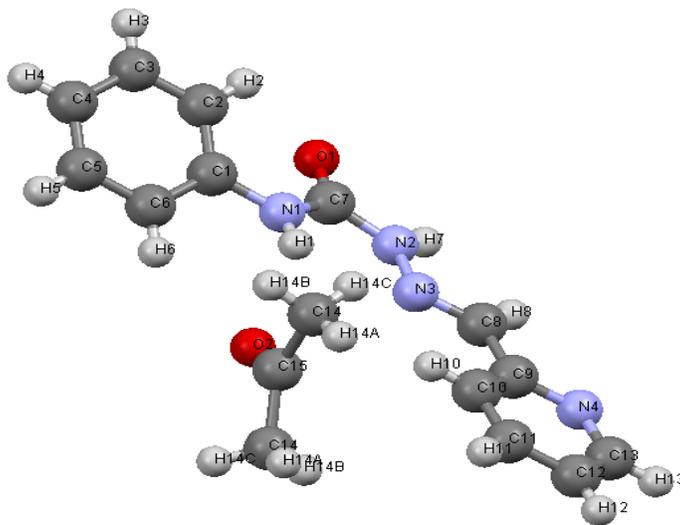
**Fig. S6.** Evolution of ultra-visible absorption spectra during the titration of **1** ( $1.0 \times 10^{-5} \text{ mol} \cdot \text{L}^{-1}$ ) in dichloromethane solution with acetic acid.



**Fig. S7.** Evolution of ultra-visible absorption spectra during the irradiation of **1** ( $1.0 \times 10^{-5} \text{ mol} \cdot \text{L}^{-1}$ ) in dichloromethane solution added with 3.5eq acetic acid(a) and pure **1** ( $1.0 \times 10^{-5} \text{ mol} \cdot \text{L}^{-1}$ ) in acetonitrile solution(b) .



**Fig. S8.** CD spectra of E-1 crystallized in difference space group in KCl. (A mixture of 1 mg of the solid powder and 50 mg of KCl was well ground and formed into a disk with a radius of 5 mm.)



**Fig. S9.** The crystal structure of **1** crystallized in acetone solution. It belongs to orthorhombic system, space group Pbcn with  $a = 17.669(3)$ ,  $b = 8.668(1)$ ,  $c = 18.288(2)$  Å,  $V = 2835.9(6)$  Å<sup>3</sup>,  $Z = 4$ ,  $D_c = 1.26$  g/cm<sup>3</sup>,  $F(000) = 1135.7$  and  $\mu = 0.086$  mm<sup>-1</sup>. A total of 12064 reflections were collected, of which 2597 were unique. The structure was solved by direct methods and refined to the final  $R = 0.076$  and  $wR = 0.227$  for 1899 observed reflections ( $I > 2\sigma(I)$ ). There exist intramolecular hydrogen bonds of N(1)–H(1)  $\cdots$  N(3) and intermolecular hydrogen bonds of N(1)–H1  $\cdots$  O(2) in the structure. The dihedral angle between pyridine ring and benzene ring in this *trans*-**1** crystal is 34.38°(0.17).

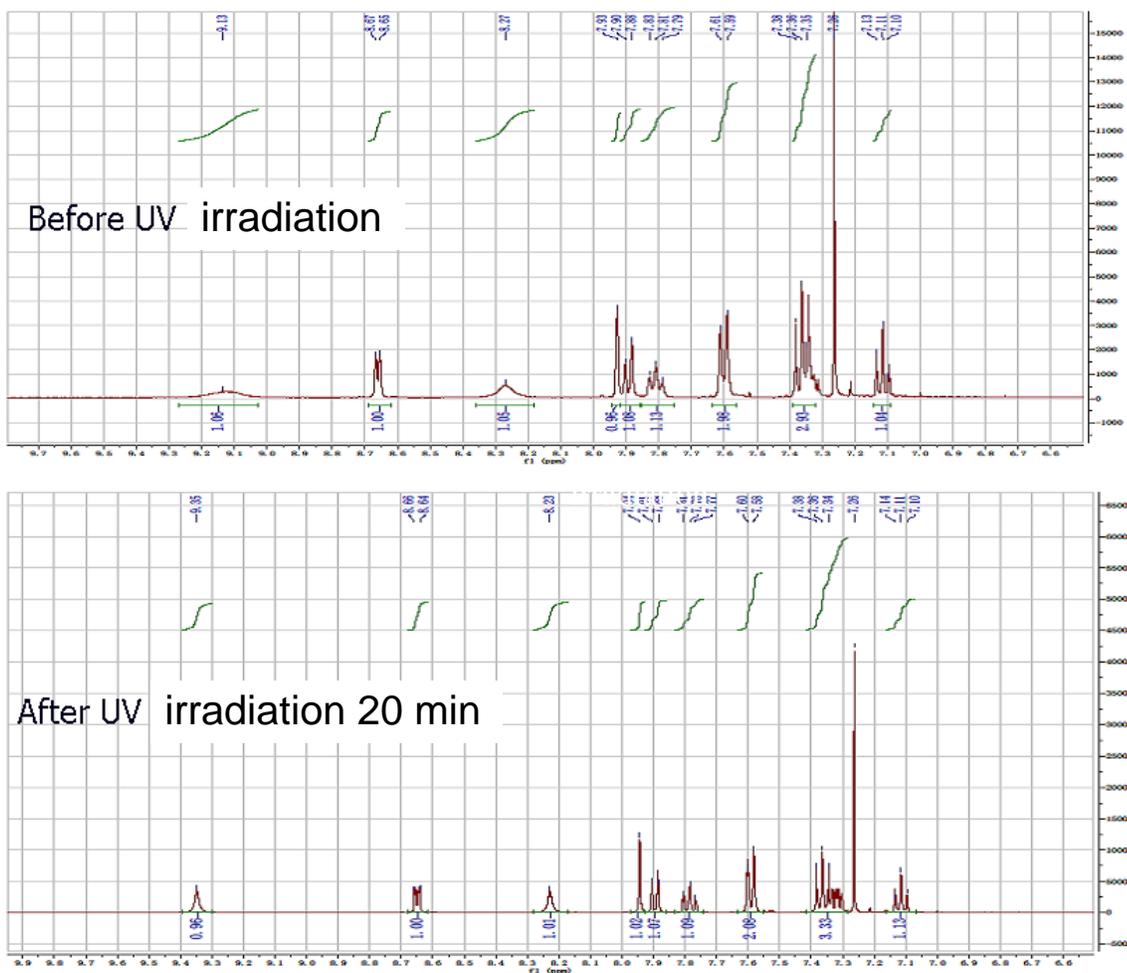


Figure S10.  $^1\text{H}$  NMR spectra of **1** in  $\text{CDCl}_3$  before and after UV irradiation.

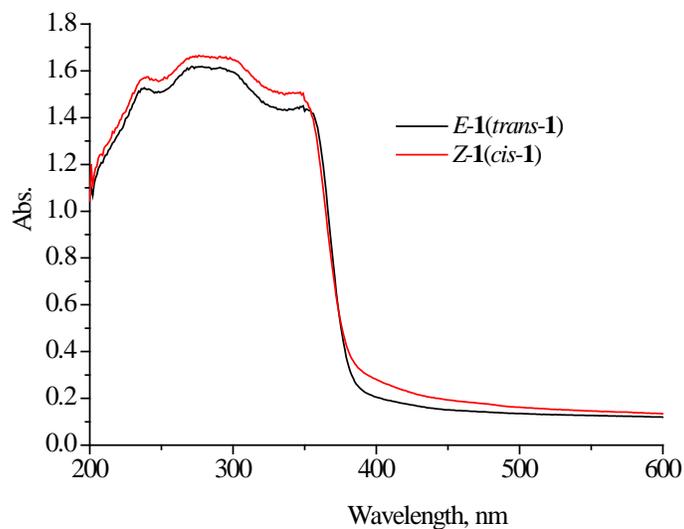
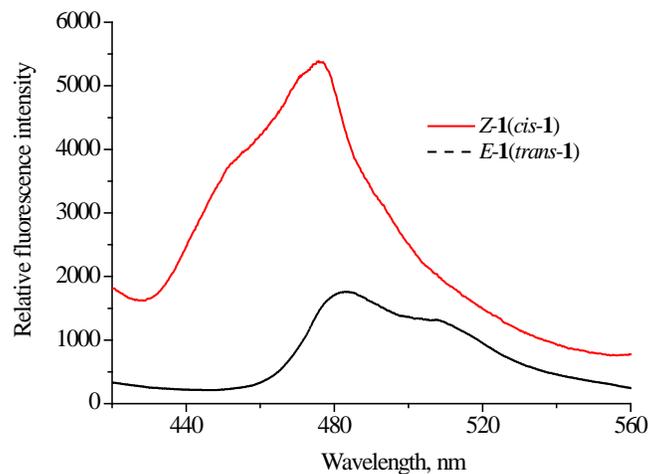
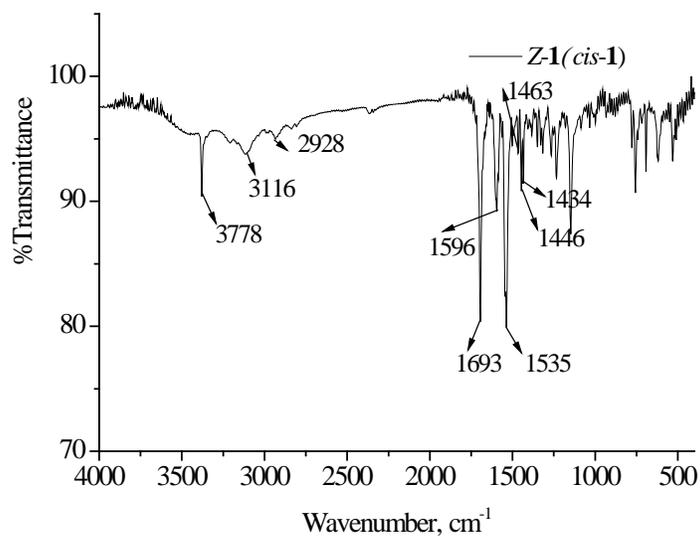


Figure S11. The absorption spectra of the solid powder of *E*-**1** isomer and *Z*-**1** isomer.



**Figure S12.** The fluorescence spectra of the solid powder of *E*-1 isomer and *Z*-1 isomer with excitation at 360nm.



**Figure S13.** FT-IR spectrum of the solid powder of *Z*-1 isomer. (FT-IR spectrum of *E*-1 isomer can be seen in the Fig.8 in the text.)