Effective electrons transfer pathway of the ternary TiO2/RGO/Ag nanocomposite with enhanced photocatalytic activity under visible light

Hongwei Tian[1,*], Chenxing Wan[1], Xin Xue[2], Xiaoying Hu[3], Xiaoyi Wang[4*]

1 Department of Materials Science and Key Laboratory of Automobile Materials of MOE, Jilin University, Changchun, China; 626374440@qq.com(C.W.)

2 The Second Hospital, Jilin University, Changchun, China; xuexinsir@163.com(X.X.)

3 College of Science, Changchun University, Changchun, China; huxy@ccu.edu.cn(Y.H.)

4 Key Laboratory of Optical System Advanced Manufacturing Technology, Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, Changchun, 130033, China

* Correspondence: E-mail: tianhw@jlu.edu.cn(H.T.); wangxiaoyi1977@sina.com(X.W.); Tel.:+86-0431-8516-8444(H.T.); +86-0431-8670-8126(X.W.)

Table S1. Textural properties of MT, MTG and MTGA-8 nanocomposites.

Catalysts	Specific surface area (m²/g)	Pore diameter (nm)
MT	146	8.39
MTG	145	8.24
MTGA	119	8.08

Table S1 summarizes the specific surface area, pore diameter of various samples. The average pore size of MTGA-8 was 8.08 nm in the range of allowable error compared with MT and MTGA, which infer that the decoration of Ag nanoparticles basically do not destroy the original structure. Among all the prepared photocatalysts, the BET surface area of MTGA-8 catalyst was found to be decreasing to 119 m2/g, however, the photocatalytic activity of MTGA-8 is the best compared with MTG and MT, which the reason is perhaps that the deposition of Ag nanoparticles although block part of the channels resulting in the decrease in specific surface area but enhance light absorption and electron transfer due to the LSPR effect of Ag nanoparticles.[1]
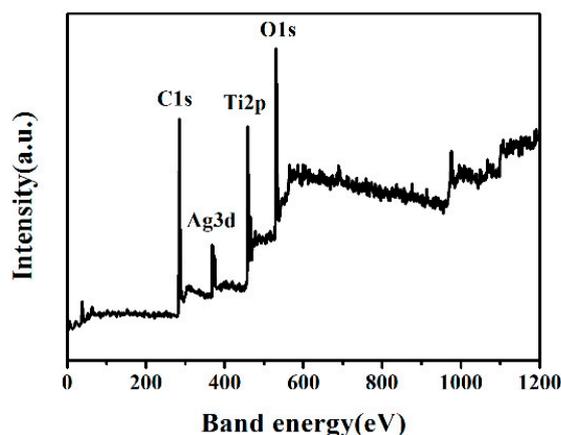

Figure S1. XPS survey spectrum of MTGA-8 nanocomposite.

Figure S1 shows the survey spectrum of MTGA-8 nanocomposite, from which we can see that MTGA nanocomposite include C, Ag, Ti and O elements, from another side proving the fact of the coexistence of TiO2 and Ag.
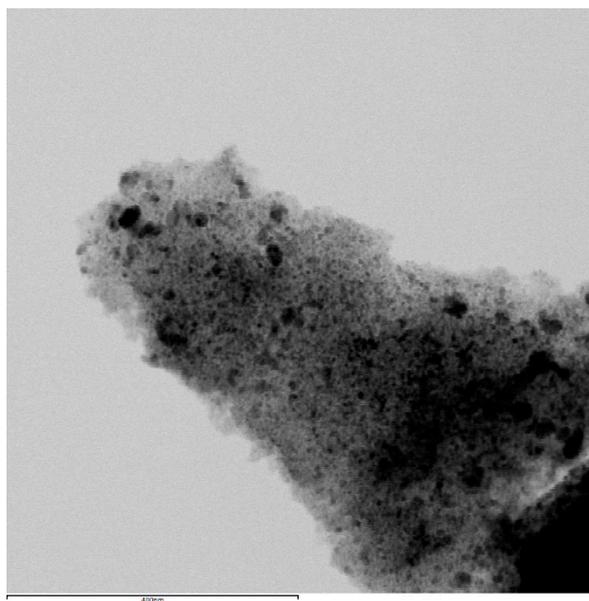
Figure S2. The selected pattern with the elemental mapping of MTGA-8 nanocomposite.

Figure S2 exhibits the selected pattern with the elemental mapping of MTGA-8 nanocomposite. The elemental mapping patterns presents at Figure 6.

Table S2. The apparent reaction rate constants k in the presence of visible light of MT, MTG and MTGA nanocomposites

Catalysts	MT	MTG	MTGA-3	MTGA-5	MTGA-8	MTGA-10
K/min^{-1}	0.00151	0.00519	0.01141	0.01003	0.01742	0.01288

Table S2. presents the apparent reaction rate constants k under visible light of samples. The k of MTGA-8 is 0.017 min^{-1}, the highest value of all samples, which is 3.4 times the degradation rate of MTG.

References

1.   Qu, Y.; Duan, X. Progress, challenge and perspective of heterogeneous photocatalysts. *Chem Soc Rev* **2013**, *42*, 2568-2580.