Supplementary Information for *RSC Advances*

Synthesis of Mo-doped TiO_2 Nanowires/Reduced Graphene Oxide Composites with Enhanced Photodegradation Performance under Visible Light Irradiation

Shanshan Zhu,[a] Yuming Dong,[a] Xiaofeng Xia,[a] Xiang Liu*[a] and Hexing Li*[b]

[a.] *The Laboratory of Food Colloids and Biotechnology, Ministry of Education, School of Chemical and Material Engineering, Jiangnan University, Wuxi 214122, P. R. China. E-mail: liuxiang@jiangnan.edu.cn;*

[b.] *The Key Laboratory of the Chinese Ministry of Education in Resource Chemistry, Shanghai Normal University, Shanghai 200234, P. R. China. E-mail: hexing-li@shnu.edu.cn*

Content

1. Influence of RGO amount on the photocatalytic activity of Mo-TiO_2NWs/RGO composites

In order to investigate the influence of RGO amount on the photocatalytic activity of Mo-TiO_2NWs/RGO composites, we further studied the photocatalytic efficiency of Mo-TiO_2NWs/RGO-1, Mo-TiO_2NWs/RGO-10 and Mo-TiO_2NWs/RGO-20 composites for the degradation of MB. It is not difficult to find from the degradation results (shown in Fig. S1, ESI†) that the order of photodegradation efficiency of Mo-TiO_2NWs/RGO composites is as follows: Mo-TiO_2NWs/RGO-5> Mo-TiO_2NWs/RGO-10> Mo-TiO_2NWs/RGO-1> TiO_2NWs/RGO-20. Therefore, excessive RGO could be detrimental for the photocatalytic degradation of MB. Although incorporation with graphene can retard the recombination of electron-hole pairs, it may also obstruct photon absorption, thus weakening photocatalytic degradation efficiency (F. Wang and K. Zhang, *Journal of Molecular Catalysis A: Chemical*, 2011, **345**, 101-107.).

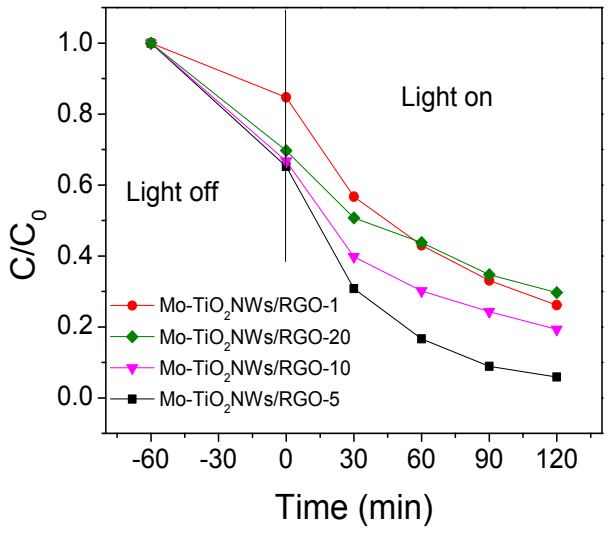

Fig. S1 The photocatalytic degradation curves of Mo-TiO_2NWs/RGO-x for MB.

2. Thermogravimetric analysis (TGA) of Mo-TiO_2NWs/RGO composites

The amount of RGO in Mo-TiO_2NWs/RGO composites was estimated on a Thermogravimetric analysis (TGA) in air flow at a heating rate of 10°C/min. As shown in Fig. S2, a large weight loss can be observed between 220°C and 530°C, indicating that the total amount of RGO in Mo-TiO_2NWs/RGO composites is about 5.07 wt%.

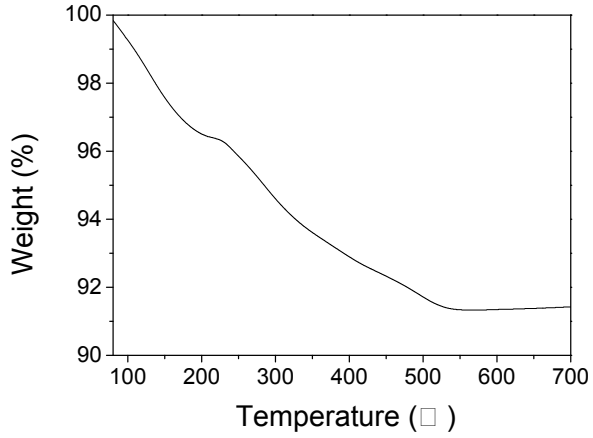

Fig. S2 TGA analysis for Mo-TiO_2NWs/RGO composites.

3. FTIR spectra of GO and Mo-TiO_2NWs/RGO composites

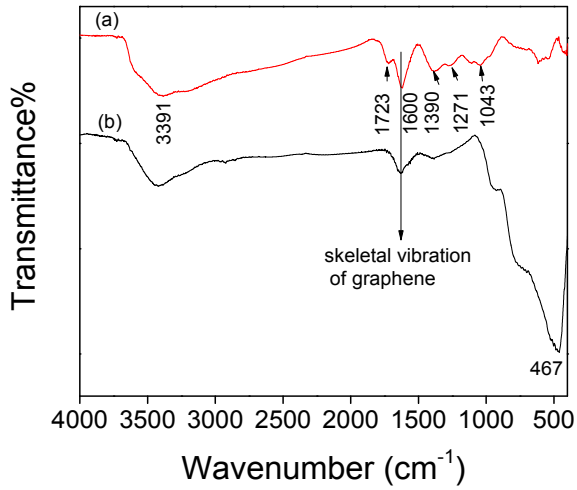

Fig. S3 FTIR spectra of GO (a) and Mo-TiO_2NWs/RGO composites (b).

4. Comparison of absorbing capacity of different catalysts and the cycle tests of Mo-TiO_2NWs/RGO composites

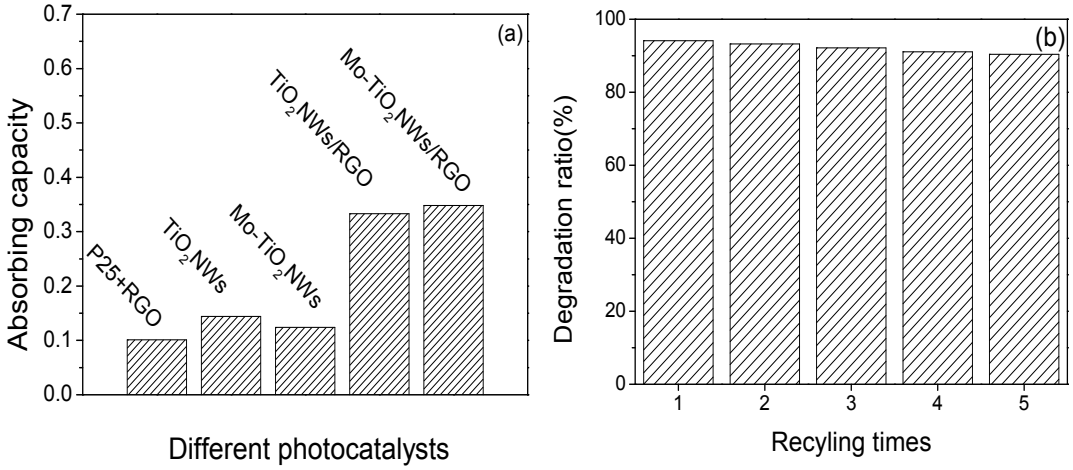

Fig. S4 The absorbing capacity of different catalysts after achieving adsorption equilibrium (a) and the cycle tests of Mo-TiO_2NWs/RGO composites for degradation of MB (b).

5. Comparison of photocatalytic activity between Mo-TiO_2NWs/RGO composites and other doped TiO_2-graphene composites

Compared to other doped TiO_2-graphene composites[37,48-51], the Mo-TiO_2NWs/RGO composites show better photocatalytic activity for the degradation of MB. For example, the Liu's group[48] fabricated N-doped TiO_2 nanowire/N-doped graphene (N-TiO_2/NG) heterojunctions, and the degradation of MB was 87.9% by N-TiO_2/NG in 180 min under visible light irradiation. The comparison of photocatalytic activity for MB between Mo-TiO_2NWs/RGO composites and other doped TiO_2-graphene composites, gathered from the references, is shown in Table S1.

Table S1. The comparison of photocatalytic activity for MB between Mo-TiO_2NWs/RGO composites and other doped TiO_2-graphene composites.

photocatalysts	degradation efficiency for MB	Reference*
TiO_{2-x}/GR composites	about 58% in 180 min	37
N-TiO_2/NG	87.9% in 180 min	48
La/TiO_2-graphene composites	82% in 60 min	49
graphene modified nitrogen-doped anatase TiO_2 plates with exposed {001} facets	about 75% in 120 min	50
N-TiO_2/N-graphene	about 75% in 120 min	51
Mo-TiO_2NWs/RGO composites	83.4% in 60 min 94.1% in 120 min	this work

* References are consistent with the references in the Main Article.