Supporting Information

Construction of multifunctional films based on graphene-TiO_2 composite materials for strain sensing and photodegradation

Yong Liu, Dong Zhang*, Yu Shang, Wenting Zang and Miaomiao Li

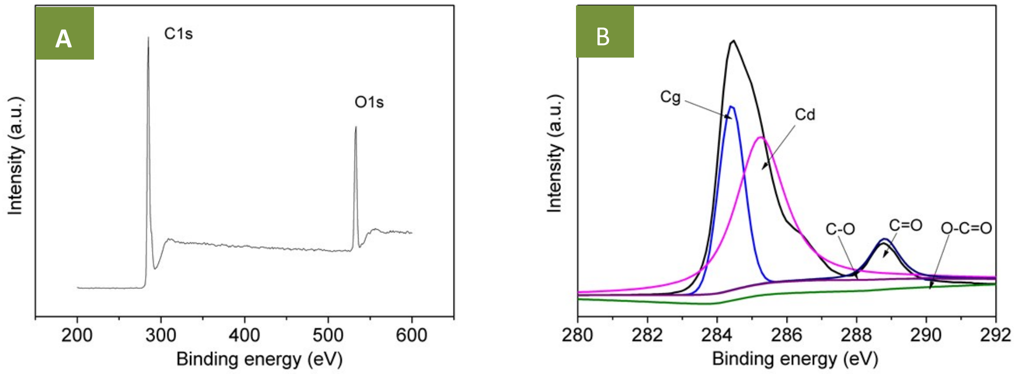
Key laboratory of Advanced Civil Engineering Materials, Ministry of Education, School of Materials Science and Engineering, Tongji University, Shanghai 201804, PR China

*Corresponding author. Tel/fax: +86 21 69582144.

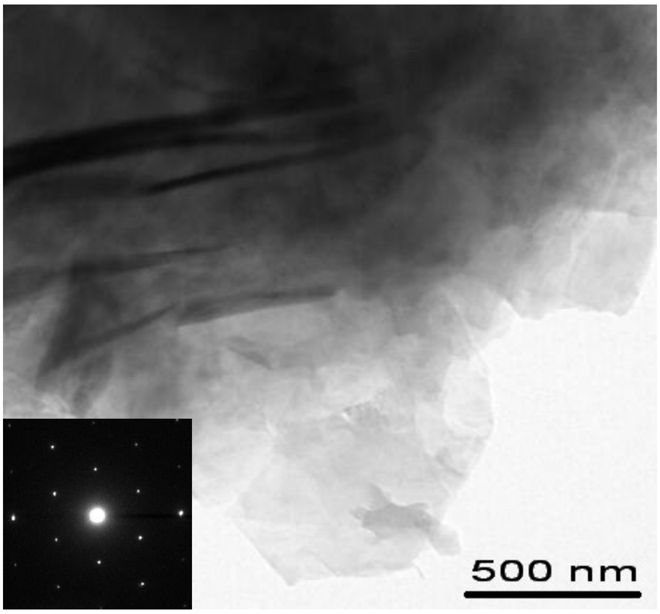
Email: zhangdng@tongji.edu.cn

Characterization of raw materials

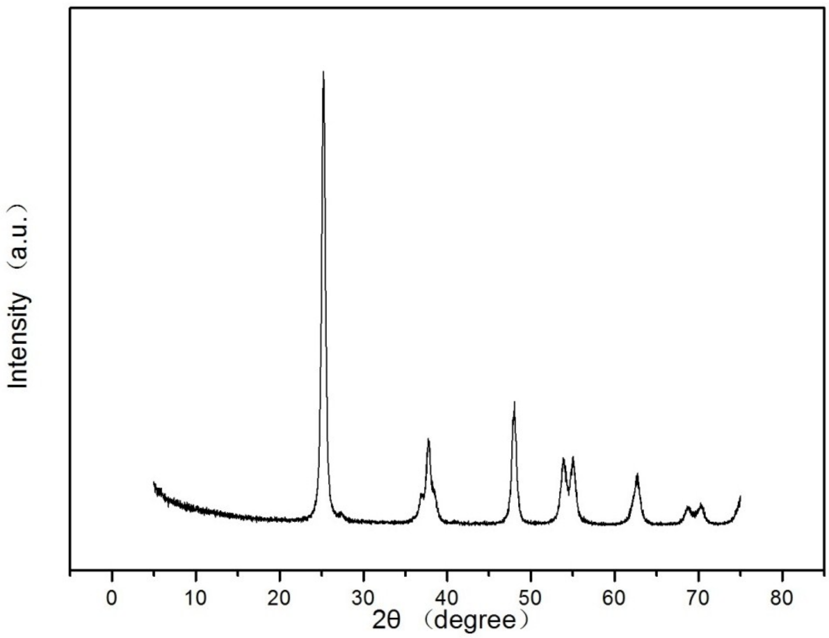
The graphene raw materials were provided by the XG Sciences Inc (USA). Based on the information of the preparation process that provided by the XG Science Inc, the method to prepare this graphene is rather different. The graphite was treated by sulfuric acid and sodium hydroxide successively, and then sonication treatment for 4 hours. During this process, mild oxidation happened. Thus the oxygen-containing functional groups can be found on the graphene sheet surface as shown in Fig. S1. However, the C/O atomic ratio of the sample is still around 4.5. As only mild oxidation happened, the van der waals force is still large enough, the thickness of the graphene flakes is around 3.5 nm which corresponding to three layers to ten layers considering the oxygen functional groups existed on the graphene sheet. In addition, the lateral-dimensional size of the few layer graphene flakes is around 2 μm, and Fig. S2 shows the TEM image of the graphene. The graphene is hydrophilic due to the oxygen-containing functional groups, which gives the graphene sheets good solubility in solvents and provides fertile opportunities for the processability of this nanomaterial.



S1. XPS general spectra and curve fitting of C1s spectra of graphene



S2. TEM image of graphene



S3 XRD patterns of TiO_2 (Anatase, 25nm)