**Supplementary Information**

**Ultra-light and compressible 3D BiOCl/RGO aerogel with enriched synergistic effect of adsorption and photocatalytic degradation of oxytetracycline**

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**1. Experimental Section**

**1.1 Materials**

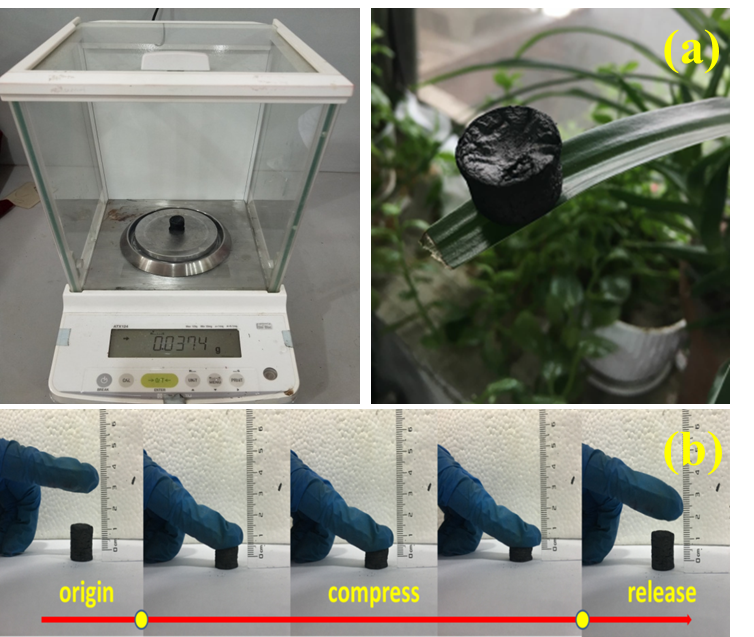
All the reagents were purchased from Aladdin and used as received without further purification. In addition to the use of ultra-pure water in HPLC, deionized water was used in throughout this study.

**1.2 Characterization**

The crystal phase of synthesized composites was analyzed by X-ray diffraction (XRD; Bruker-D8-AXS). The morphologies were inspected by field emission scanning electron microscope (FESEM; Zeiss SUPRA40) and Transmission electron microscopy (TEM; JEM-2100). Fourier transform infrared (FT-IR) spectra were detected on a FTIR Analyzer (NEXUS, Spectrum 400) with KBr as a reference sample. Raman spectra were recorded using a SPEX-1403 laser Raman spectrometer. X-ray photoelectron spectroscopy (XPS) was conducted by ESCALA-260Xi microprobe. Nitrogen adsorption-desorption was proceeded on a nitrogen adsorption apparatus (BEL, JAPAN) to determine the Brunauer-Emmett-Teller specific surface areas and pore volume.

The cyclic voltammetry measurement (CV) and electrochemical impedance spectroscopy (EIS) were conducted on the electrochemical system (Zahner, Germany) with a standard three-electrode cell with a working electrode, a platinum wire counter electrode, and a standard calomel electrode (SCE) reference electrode. PBS (0.5 M) was used as the electrolyte solution. CV was detected at the scan rate of 5 mv⋅s−1 in the potential range between -0.2-0.3V. Electrochemical impedance spectroscopy (EIS) was carried out at the open-circuit potential; a sinusoidal ac perturbation of 5 mV was applied to the electrode over the frequency range 0.01 to 1 × 105 Hz.

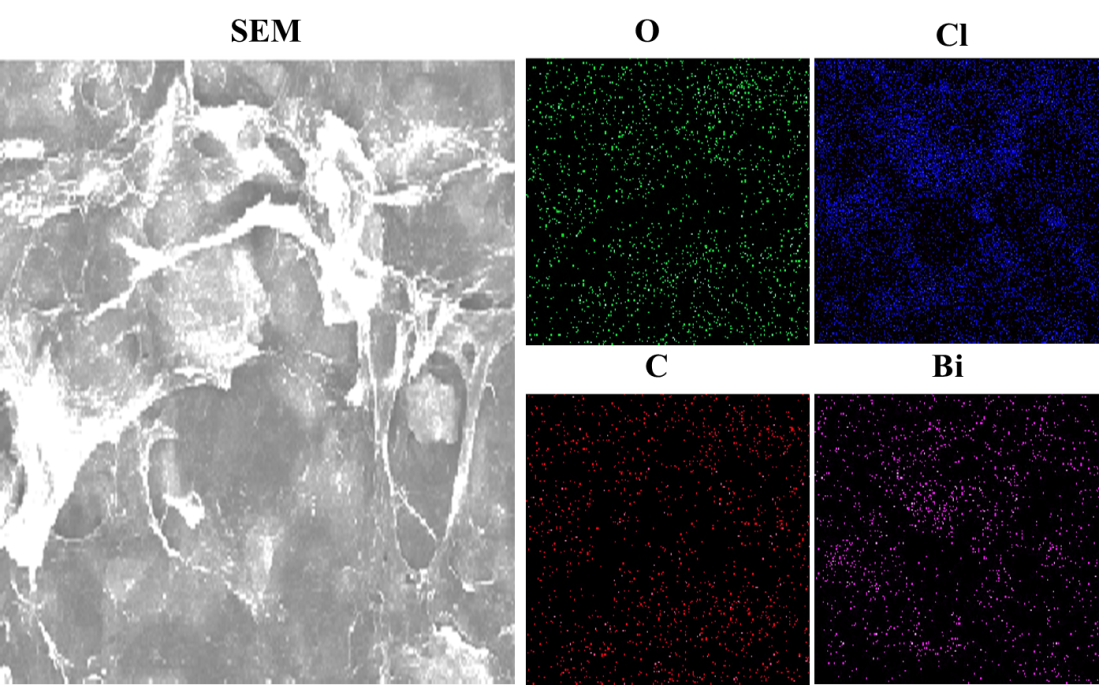
**2. Results and disscussion**



**Fig S1**. (a)The weight measurement processes for the 40% BGA with a density of 8.45 mg⋅cm-3 (37.4 mg in 4.42 cm-3). (b) Snapshots of BGA under compression and recovering process,

**Table S1** Experimental content of Raman peaks

|  |  |  |  |
| --- | --- | --- | --- |
| Sample | D peak | G peak | ID/IG |
| Positions(cm-1) | Positions(cm-1) |
| GO | 1344 | 1590 | 0.93 |
| GA | 1346 | 1580 | 1.02 |
| 20% BGA | 1344 | 1588 | 1.17 |
| 40% BGA | 1340 | 1584 | 1.37 |
| 60% BGA | 1344 | 1587 | 1.15 |



**Fig. S2**. Corresponding elemental mapping of 40% BGA



**Fig S3** Degradation efficiencies of the different types dye and antibiotic-contained wastewater over 40% BGA;

**Table S2** Comparison of various aerogels for simulated wastewater treatment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Hybrid materials | Synthesis method | Simulated wastewater | Degradation efficiency | Reference |
| Bi2WO6/graphene aerogel  graphene/PDI aerogel  graphene/FexOy /nitrogen-doped carbon layer aerogel  graphitic carbon nitride/reduced graphene  Ag/AgBr/g-C3N4@NGA  g-C3N4/GO aerogel  BiOBr/RGO aerogel  BiOCl/graphene aerogel | hydrothermal  low-  temperature hydrothermal  two-step  pyrolyzation  reduction self-assembly  hydrothermal  reduction self-assembly  two steps hydrothermal  hydrothermal | MB  40 mg⋅L−1  Phenol  5 mg⋅L−1  RhB  10 mg⋅L−1  RhB  20 mg⋅L−1  Methyl orange  10 mg⋅L−1  BPA 10 mg⋅L−1  Methyl orange  20 mg⋅L−1  Methyl orange  10 mg⋅L−1  RhB 10 mg⋅L−1  OTC 20 mg⋅L−1  RhB 20 mg⋅L−1  CAP 10 mg⋅L−1  SMM10 mg⋅L−1 | 50.6%  92%  96%  95.2%  96%  92%  90%  80%  50%  93.3%  92.9%  79.1%  87.8% | [[1](#_ENREF_1)]    [[2](#_ENREF_2)]  [[3](#_ENREF_3)]  [[4](#_ENREF_4)]  [[5](#_ENREF_5)]  [[6](#_ENREF_6)]  [[7](#_ENREF_7)]  This work |

**Reference**

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