

Table S1. The detailed procedure of synthesis of GO.

Operating steps	Detailed procedure
Pre-oxidation	Add 20 mL conc. H ₂ SO ₄ into a flask, add 1.0000 g K ₂ S ₂ O ₈ and 1.0000 g P ₂ O ₅ , heat in 80°C oil bath with magnetic stirring for 0.5 h. Add 2.0000 g graphite, react at 80°C for 4.5 h, cool to RT, stir in ice bath for 0.5 h. Transfer to 1000 mL deionized water, stir for 0.5 h, filter until pH 5.5, dry at RT for 12 h.
Deep oxidation	Add 50 mL conc. H ₂ SO ₄ into a flask in an ice bath. Add crushed filter cake, wash with 10 mL H ₂ SO ₄ . Slowly add 10 g KMnO ₄ over 0.5 h keeping temp <20°C. Wash with 15 mL water, stir in ice bath for 10 min. React at 35°C for 2 h. Cool in ice bath, add 160 mL deionized water dropwise, stir for 2 h. Transfer to 400 mL water, wash flask with 100 mL water, add 8.3 mL 30% H ₂ O ₂ , stir for 30 min, let stand in dark for 8 h.
Centrifugal washing	Remove supernatant, add 800 mL 10% HCl, stir in dark for 3 h, let stand for 8 h, remove supernatant. Add 400 mL deionized water, stir for 3 h, centrifuge until neutral, freeze-dry to obtain GO powder.
Ultrasonic exfoliation	Disperse 10 mg GO in 100 mL water, sonicate to obtain 0.1 mg/mL GO suspension.

Table S 2 The scoring criteria for both liver and kidney tissues.

Parameter	0	1	2	3
Cellular infiltration	No infiltration of inflammatory cells	Mild infiltration with a few scattered inflammatory cells.	Moderate infiltration with visible clusters of inflammatory cells.	Severe infiltration with extensive areas of inflammatory cells
Tissue damage	No visible damage to the tissue architecture	Slight disruption of normal tissue structure	Moderate damage with distortion of tissue architecture	Severe damage with significant alteration of tissue structure
Inflammatory foci	Absence of any inflammatory foci	One or two small foci of inflammation	Multiple small foci or a few larger foci of inflammation	Extensive inflammatory foci throughout the tissue section

The total histopathological score for each tissue sample was calculated by summing up the scores of these individual parameters. The maximum possible score for each sample was 9.

Table S 3 Gradient Dehydration Sequence

Order	Treatment	Time
1	75% Ethanol	4 h
2	85% Ethanol	2 h
3	95% Ethanol	1 h
4	Absolute Ethanol I	30 min
5	Absolute Ethanol II	30 min
6	Alcohol-Benzene	5–10 min
7	Xylene I	5–10 min
8	Xylene II	5–10 min
9	Melted Paraffin I (65 °C)	1 h
10	Melted Paraffin II (65 °C)	1 h
11	Melted Paraffin III (65 °C)	1 h

Table S4. The results of nanoindentation experiments in the different ratio of GO/Nb₂C scaffolds.

Composite scaffolds	Elastic modulus (E) MPa	Hardness (H) MPa
Pure GO	2410.988±184.440	136.195±22.417
0.2GO/ Nb ₂ C	3768.351±271.912	195.045±2.394
0.5GO/ Nb ₂ C	2931.177±124.879	168.476±4.531
1GO/ Nb ₂ C	2455.379±132.106	153.587±4.874
Pure Nb ₂ C	4034.515±82.733	198.094±3.449
Cornea *	-	11.54

Table S5 Summary of assay specifications for oxidative stress markers

Kit Name	Catalog Number	Detection Limit	Intra-assay CV	Inter-assay CV
SOD Kit	A001-3-1	0.1 U/mL	<10%	<12%
GSH-Px Kit	A005-1-2	0.05 U/mL	<8%	<10%
MDA Kit	A003-1-1	0.1 nmol/mL	<9%	<11%