Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.
This journal is © The Royal Society of Chemistry 2023

An implantable composite scaffold for amplified chemodynamic therapy and tissue regeneration

Jiafei Chen[a,#], Shiqi Wan[b,#], Yike Fu[b, c,#], Yi Zhou[a,], Xiang Li[b, c,*], Huiming Wang[a,*]*

[a] The Affiliated Hospital of Stomatology, School of Stomatology, Zhejiang University of Medicine, and Key Laboratory of Oral Biomedical Research of Zhejiang Province, Hangzhou, Zhejiang, 310006, China

[b] State Key Laboratory of Silicon Materials, School of Materials Science and Engineering, Zhejiang University, Hangzhou, Zhejiang 310027, P. R. China

[c] ZJU-Hangzhou Global Scientific and Technological Innovation Center, Zhejiang University, Hangzhou, 311200, P.R. China

[#] Authors with equal contribution: Jiafei Chen, Shiqi Wan and Yike Fu

* Corresponding Author:

Yi Zhou, E-mail: zyuthscsa@zju.edu.cn

Xiang Li, E-mail: xiang.li@zju.edu.cn

Huiming Wang, E-mail: whmwhm@zju.edu.cn

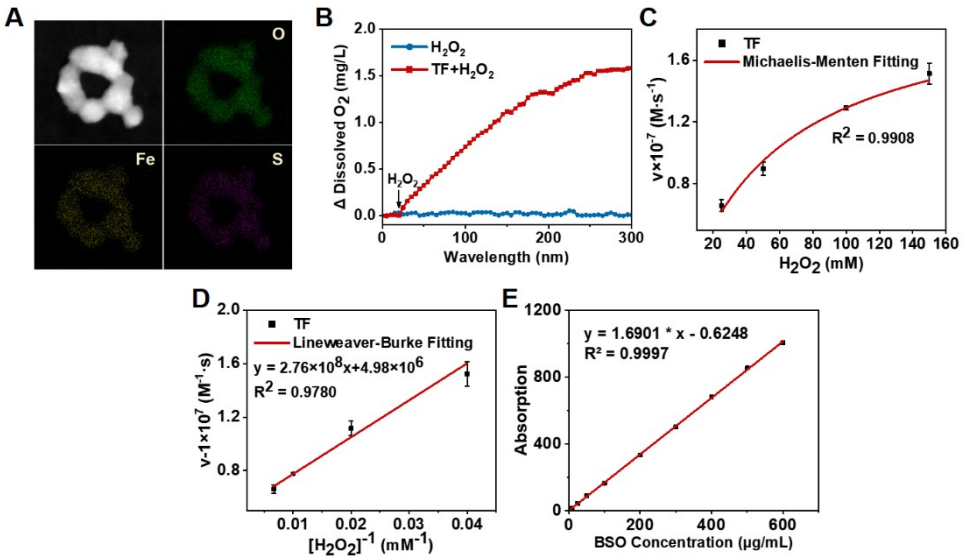

Figure S1. (A) EDS elemental mapping analysis of TF nanoparticles; (B) Time-dependent variation of dissolved oxygen concentration in TF dispersion (pH = 6.5) with and without H_2O_2; (C) The Michaelis-Menten fitting curve of initial hydroxyl radical generation velocities versus H_2O_2 concentration; (D) The Lineweaver-Burke fitting (double reciprocal) of Michaelis-Menten fitting curve. (Mean values and error bars are defined as mean and s.d., respectively); (E) The BSO standard curve of peak area quantified by high-performance liquid chromatography (HPLC).

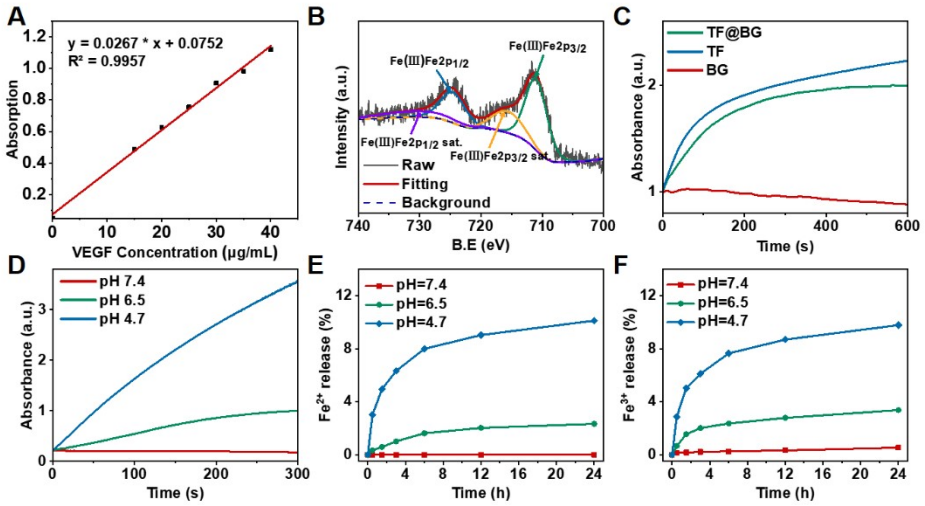

Figure S2. (A) VEGF standard curve determined by BCA protein assay; (B) Fe 2p XPS spectrum of BGV@BTF fibers; (C) UV−vis absorption spectra of TMB solution (pH=6.5) with the addition of BG nanoparticles, TF fibers and TF@BG fibers; (D) UV−vis absorption spectra of the solution containing TMB, BGV@BTF fibers and H_2O_2 at different pH values (7.4, 6.5 and 4.7); (E) Cumulative Fe^{2+} release from BGV@BTF fibers at different pH values (7.4, 6.5 and 4.7); (F) Cumulative Fe^{3+} release from BGV@BTF fibers at different pH values (7.4, 6.5 and 4.7).

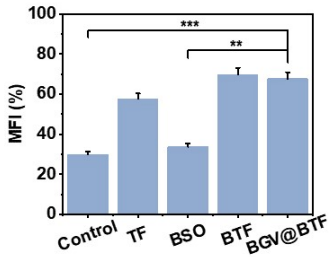

Figure S3. The mean fluorescence intensity (%) of ROS in 4T1 cells after different treatments (n=3). **p < 0.01, ***p < 0.001.

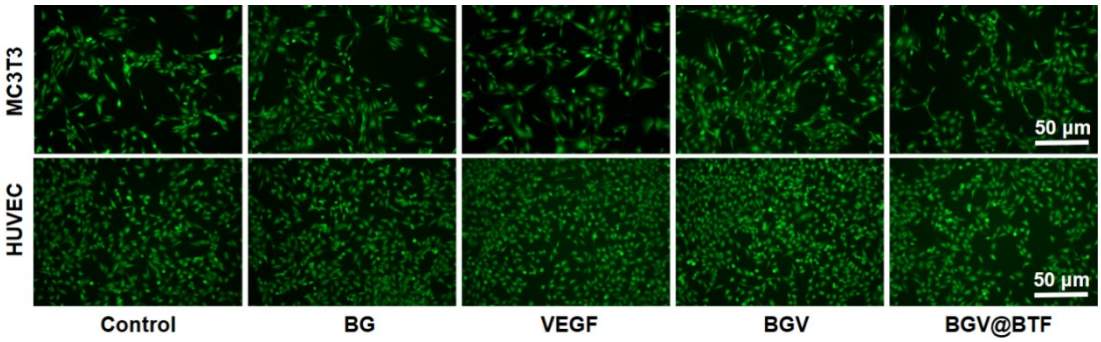

Figure S4. Fluoresence images of MC3T3 cells and HUVEC cells stained with Calcein AM (green, live cells) and PI (red, dead cells).

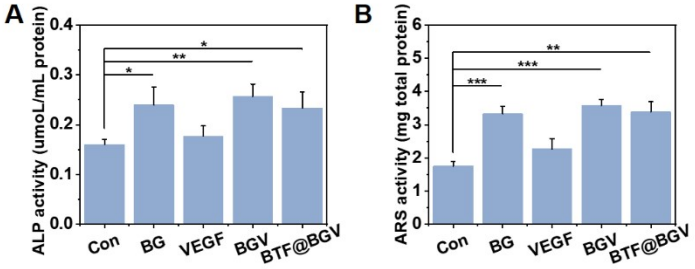

Figure S5. (A) Quantitative analysis of ALP staining; (B) Quantitative analysis of Alizarin Red S staining. *p < 0.05, **p < 0.01, ***p < 0.001.

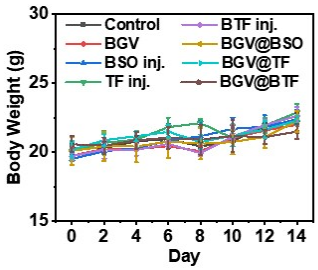

Figure S6. Body weight changes of mice subjected to different treatments.

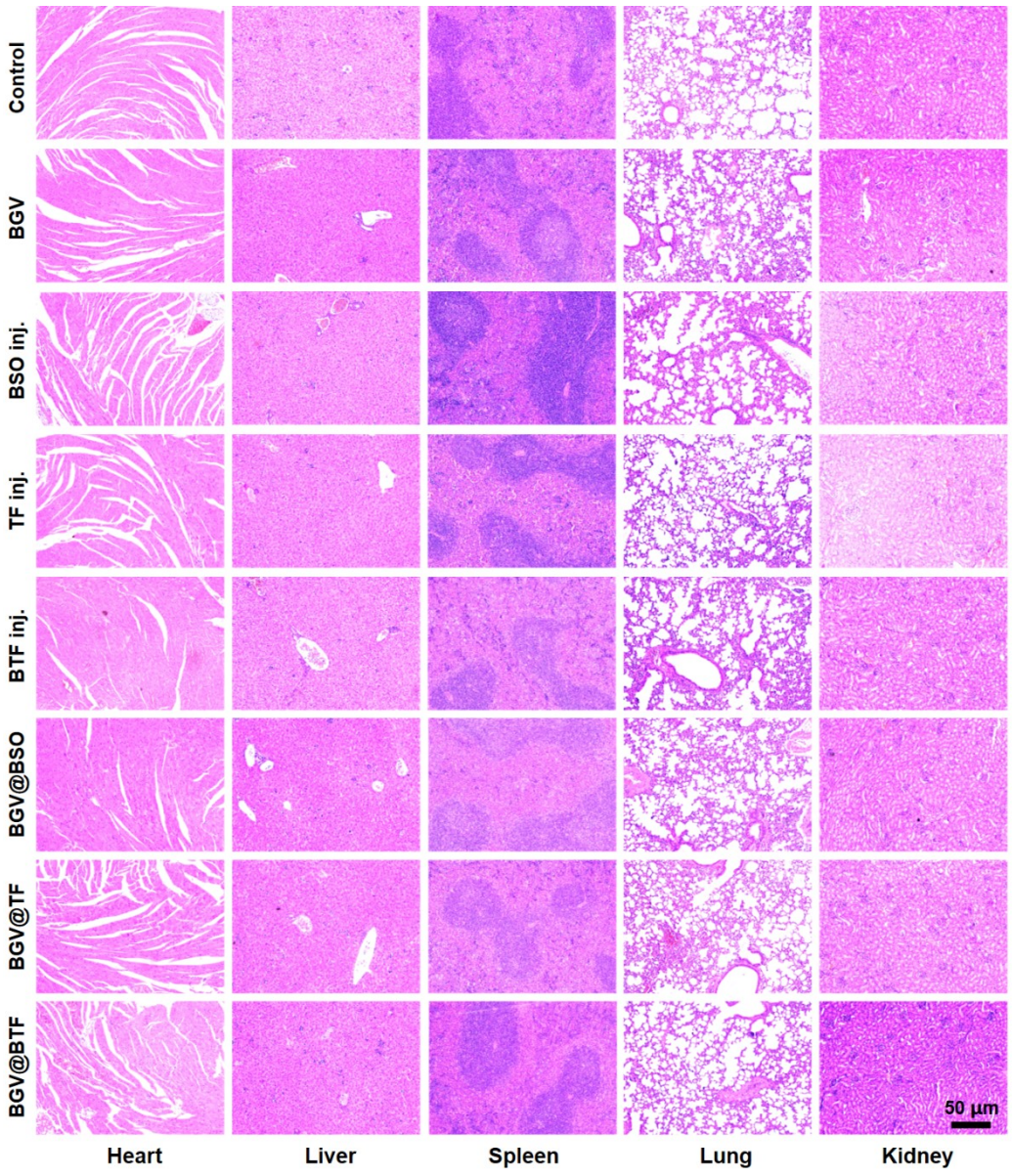

Figure S7. H&E staining of major organ (heart, liver, spleen, lung and kidney) slices.

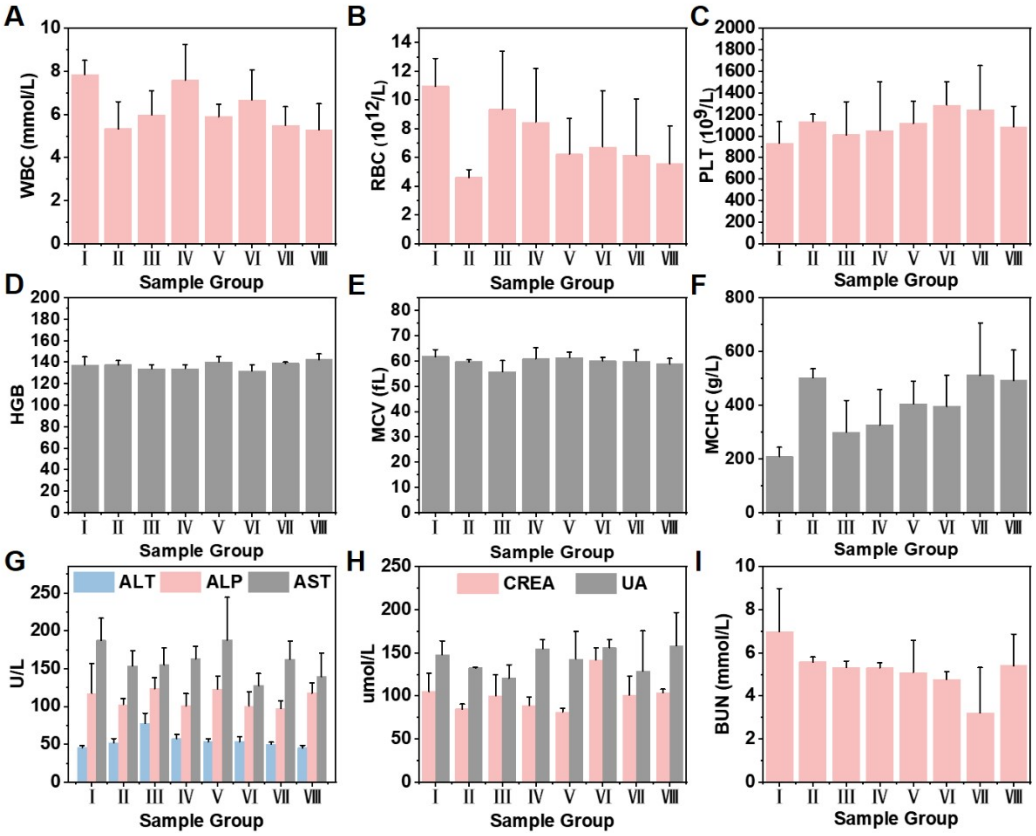

Figure S8. (A) White blood cell (WBC), (B) Red blood cell (RBC), (C) Platelets (PLT), (D) Hemoglobin (HGB), (E) Average red blood cell volume (MCV), (F) Average red blood cell hemoglobin concentration (MCHC), (G) Alanine aminutesotransferase (ALT), Alkaline phosphatase (ALP) and Aspartateaminutesotransferase (AST), (H) Creatinine (CREA) and Uricacid (UA), and (I) Blood urea nitrogen (BUN) levels of mice after different treatments for 14 days (I: control, sham operation; II: implantation of BGV fibers; III: injection of BSO; IV: injection of TF nanoparticles; V: injection of BTF nanoparticles; VI: implantation of BGV@BSO fibers; VII: implantation of BGV@TF fibers; VIII: implantation of BGV@BTF fibers). All hematological data are within the reference range.

Table 1. Loading capacity of BSO in TF nanoparticles.

System	Peak Area (mAU s^{-1})	Loading Capacity of BSO (%)	Mean Loading Capacity (%)	RSD (%)
BTF	637.5	25.4	26.2	2.8
	628.7	26.9		
	633.5	26.2		