Supporting Information

Self-luminescing theranostic nanoreactors with intraparticle relayed energy transfer for tumor microenvironment activated imaging and photodynamic therapy

Ming Wu,[ad] Lingjie Wu,[ad] Jiong Li,[acd] Da Zhang,[ad] Shanyou Lan,[abd] Xiaolong Zhang,[ad] Xinyi Lin,[ad] Gang Liu,[e] Xiaolong Liu,*[acd] and Jingfeng Liu*[abcd]

[a] The United Innovation of Mengchao Hepatobiliary Technology Key Laboratory of Fujian Province, Mengchao Hepatobiliary Hospital of Fujian Medical University, Fuzhou 350025, P.R. China

[b] Liver Disease Center, The First Affiliated Hospital of Fujian Medical University, Fuzhou 350005, P. R. China

[c] Key Laboratory of Design and Assembly of Functional Nanostructures, Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, Fuzhou 350002, P.R. China.

[d] The Liver Center of Fujian Province, Fujian Medical University, Fuzhou 350025, P.R. China

[e] Center for Molecular Imaging and Translational Medicine, Xiamen University, Xiamen 361005, P. R. China

Corresponding Authors:

*X. Liu. E-mail: xiaoloong.liu@gmail.com

*J. Liu. E-mail: drjingfeng@126.com

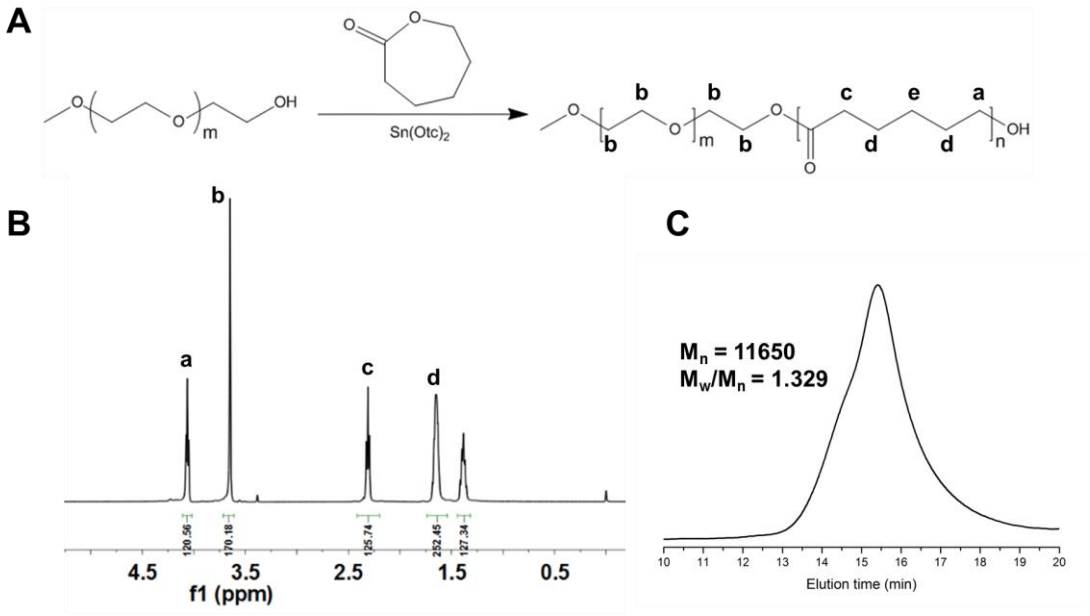

Figure S1. (A) Synthesis procedure of PEG-PCL. (B) ^{1}H NMR spectrum of PEG-PCL. (C) GPC of PEG-PCL.

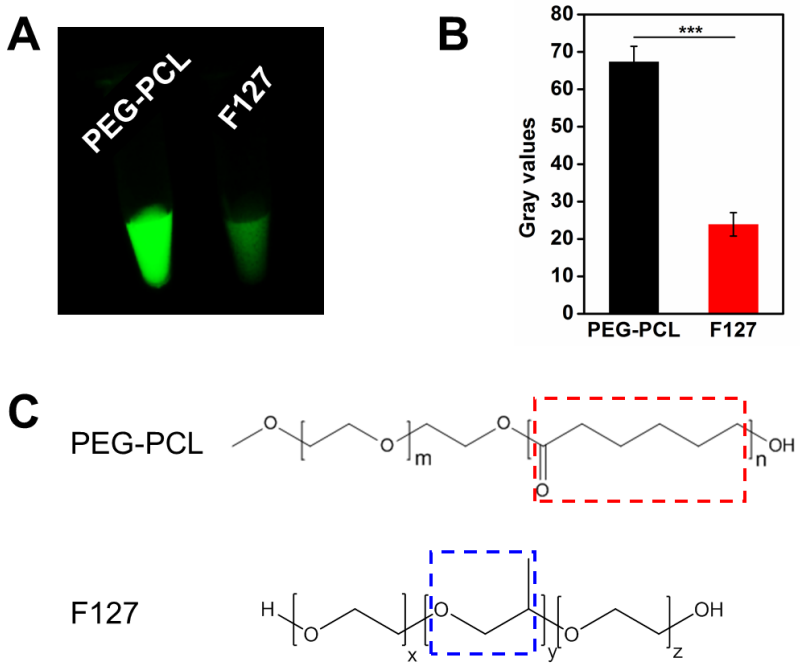

Figure S2. (A) Representative chemiluminescence images of PFPV-loaded PEG-PCL micelles or F127 micelles (1 mg/mL) with the addition of H_2O_2 (10 mM). Chemiluminescence images were collected with a 5 min of exposure time with open filter using the ChemiDocTM MP Imaging System (BIO-RAD). (B) Gray values of chemiluminescence images in Figure A calculated by Image J software. (C) Chemical structure of PEG-PCL and F127, in which the PCL segment and PPG segment were labeled in red and blue dashed box, respectively.

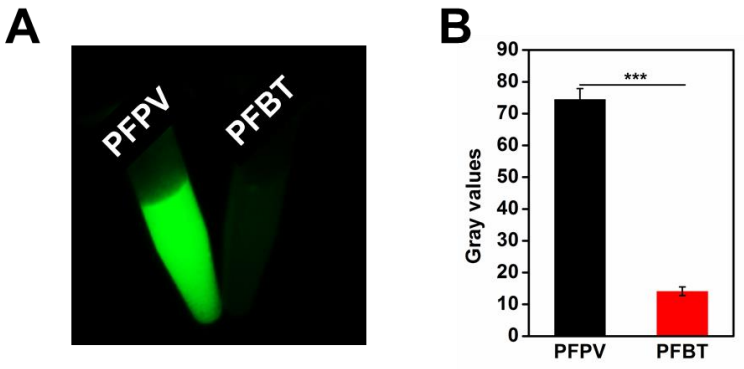

Figure S3. (A) Representative chemiluminescence images of PFPV or PFBT-loaded micelles (1 mg/mL) with the addition of H_2O_2 (10 mM). Chemiluminescence images were collected with a 5 min of exposure time with open filter using the ChemiDocTM MP Imaging System (BIO-RAD). (B) Gray values of chemiluminescence images in Figure A calculated by Image J software.

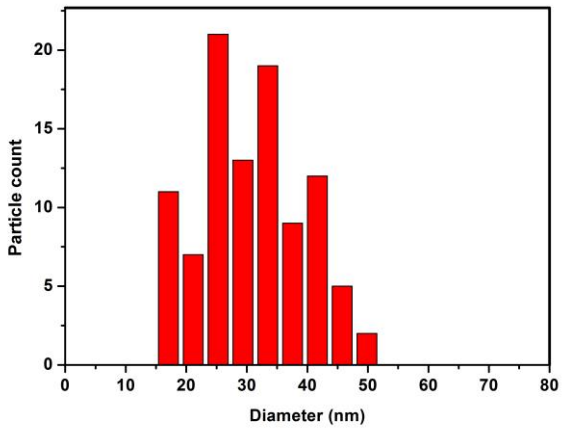

Figure S4. Size distribution of POCL measured from TEM images in Figure 1D.

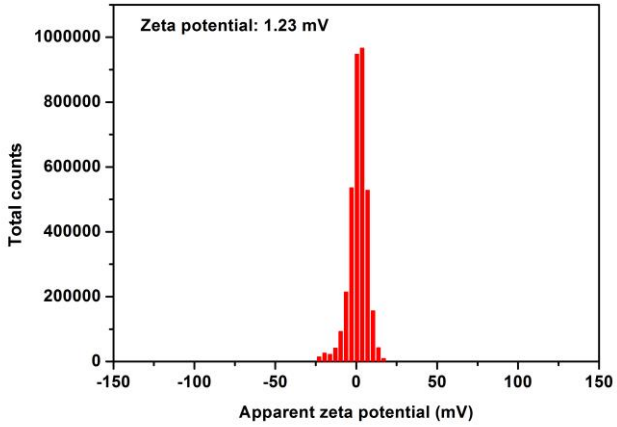

Figure S5. Zeta potential distribution of POCL.

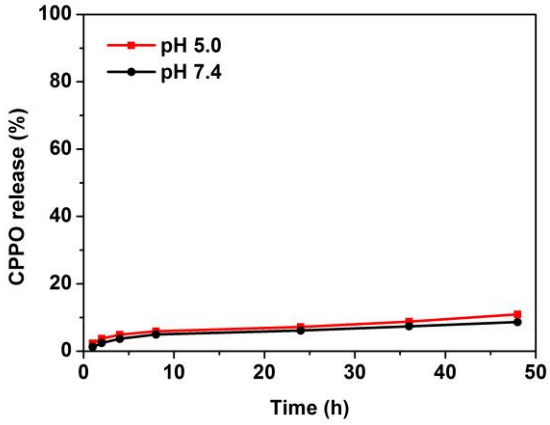

Figure S6. The release profiles of CPPO from POCL under different buffer conditions at pH 7.4 (PBS, 10 mM, 37 ^{o}C) and 5.0 (acetate buffer, 10 mM, 37 ^{o}C).

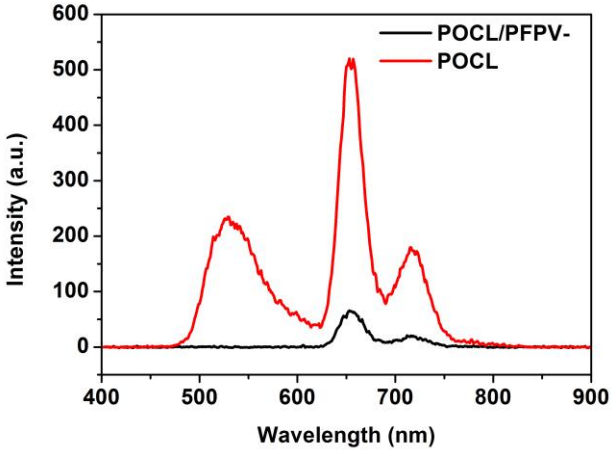

Figure S7. Chemiluminescence spectra of POCL and POCL/PFPV- by addition of excessive amount of H_2O_2 (1 M).

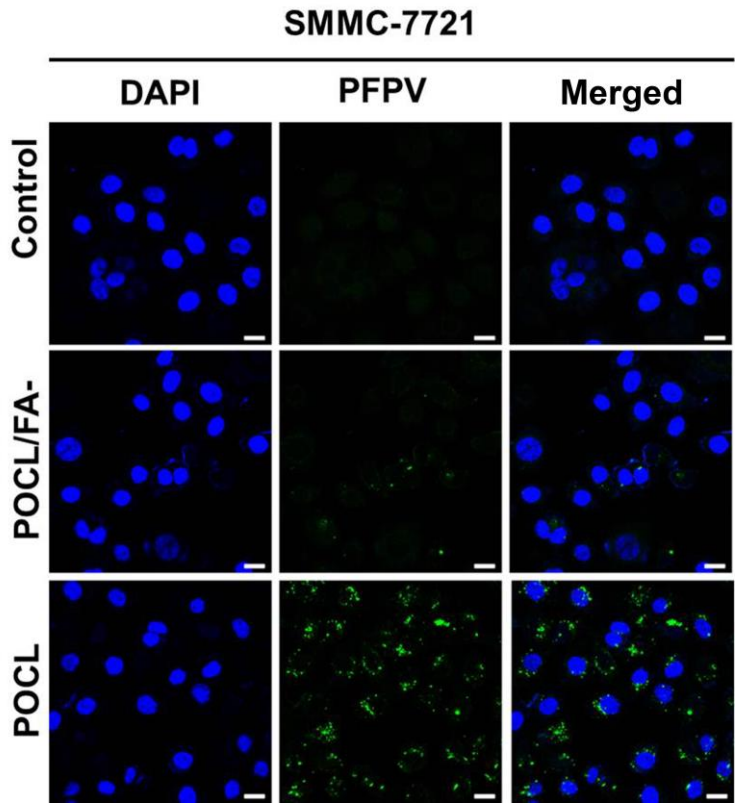

Figure S8. CLSM images of SMMC-7721 cells after incubation with POCL or POCL/FA- for 4 h. Scale bar = 20 μm.

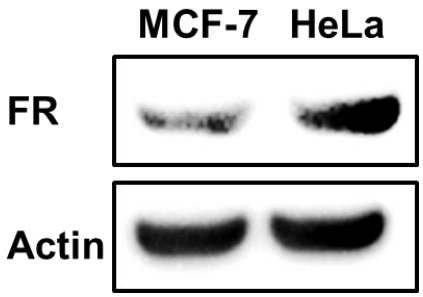

Figure S9. Western blot analysis of the folate receptor (FA) levels of MCF-7 and HeLa cells, using actin as a loading control.

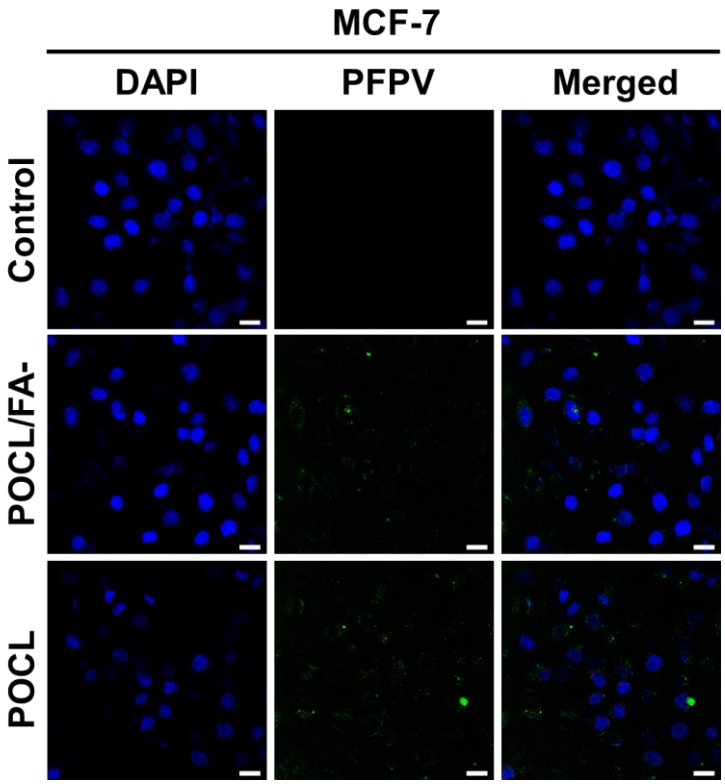

Figure S10. CLSM images of MCF-7 cells after incubation with POCL or POCL/FA- for 4 h. Scale bar = 20 μm.

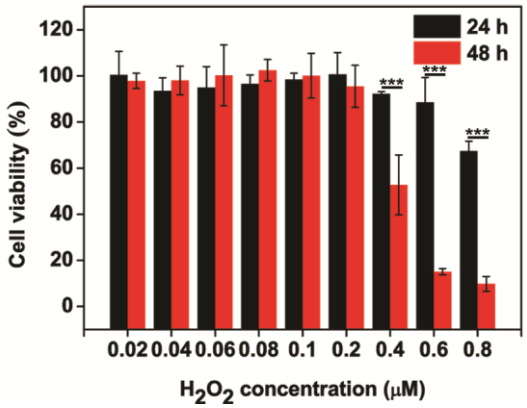

Figure S11. CCK8 assay of HeLa cells incubated with H_2O_2 at various concentrations for 24 h or 48 h.

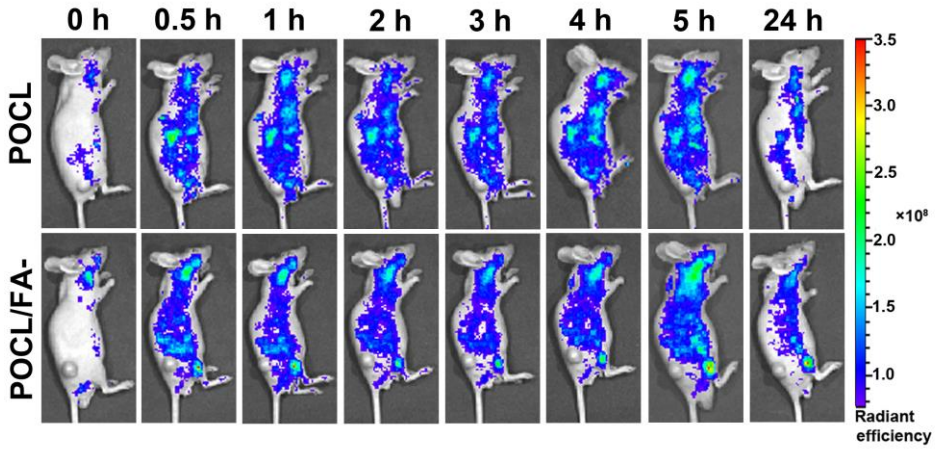

Figure S12. Time course fluorescence images of tumor-bearing mice receiving *i.v.* injection of POCL or POCL/FA- (0.2 mg/mL based on TPP, 100 μL per mouse).

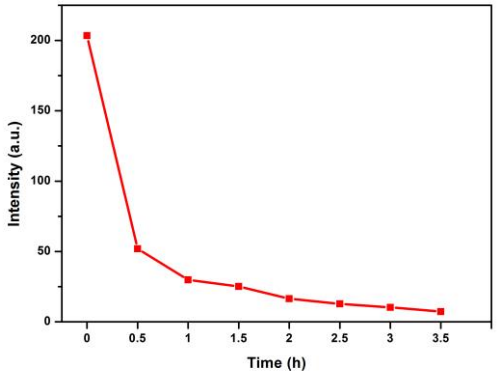

Figure S13. Chemiluminescence intensity of POCL after addition of excessive amount of H_2O_2 (1 M) for different times.

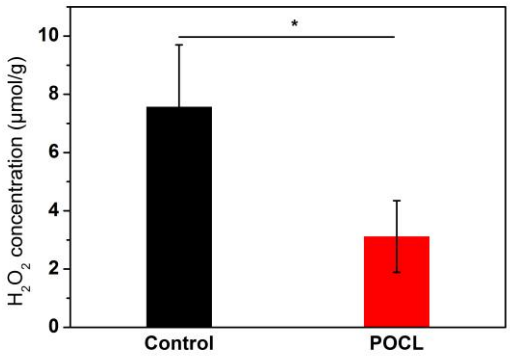

Figure S14. The change of H_2O_2 concentrations in HeLa tumors after 1 hour of POCL injection. (*P < 0.05, **P < 0.01, ***P < 0.001; n = 3 per group).

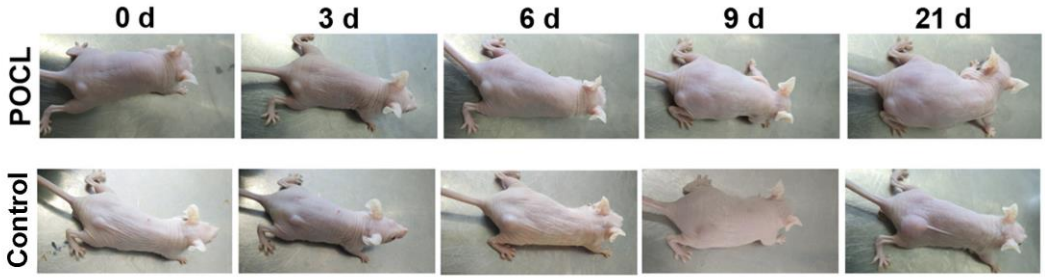

Figure S15. Photographs of the mouse taken before treatment (0 d), and at 3, 6, 9, 21 days after POCL treatments, while the mouse with saline injection was used as control.

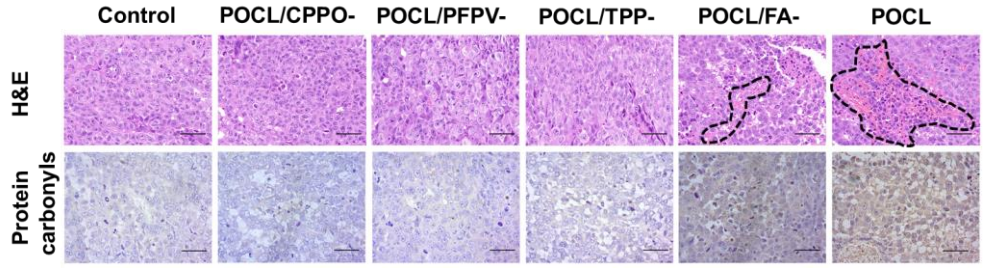

Figure S16. Optical microscopic images of tumor slices stained by H&E and protein carbonyls immunohistochemistry after 1 hour of nanoparticle injection. Scale bar = 50 μm. The black dashed circles in H&E images indicated the haemorrhage region.

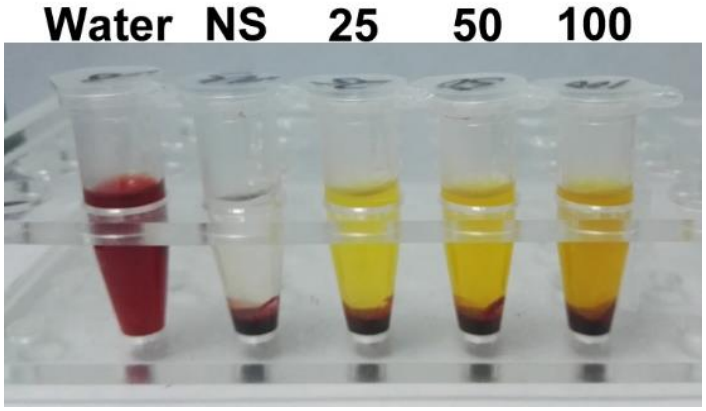

Figure S17. Photographs of RBC hemolysis assay with POCL at various concentrations, using water and normal physiological saline (NS) as the positive and negative controls, respectively.

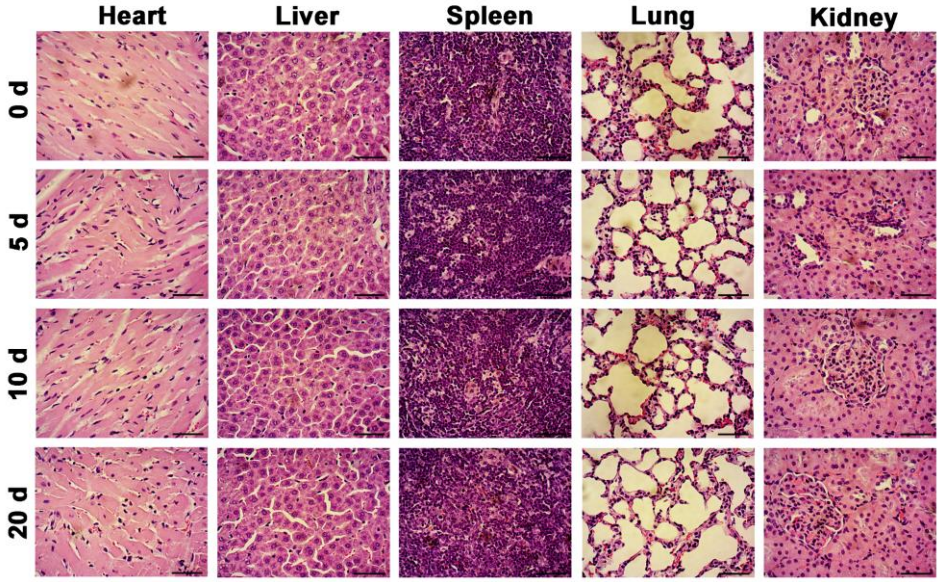

Figure S18. The pathological changes of main organs evaluated by H&E staining which were acquired at different time intervals post injection of POCL. Scale bar = 50 μm.

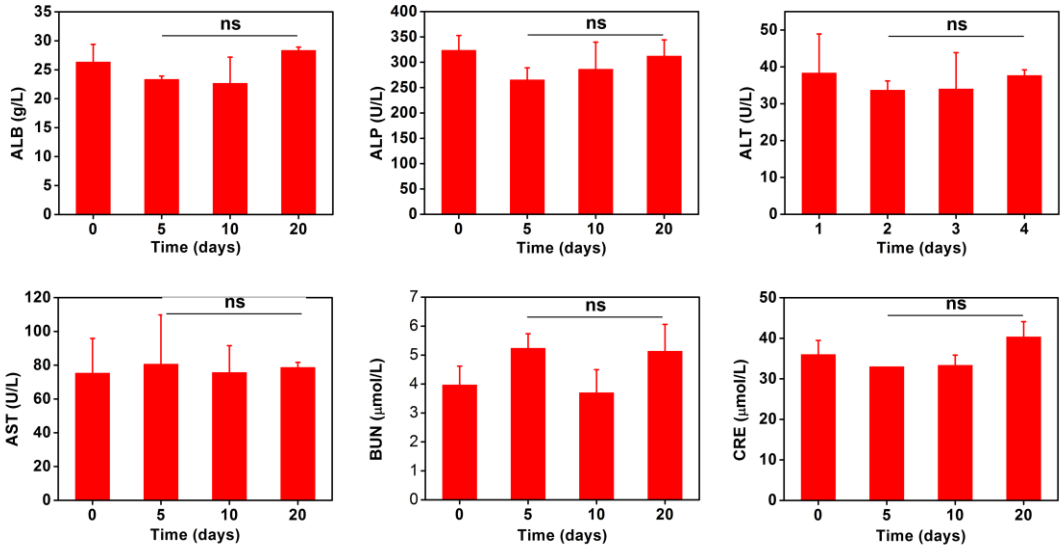

Figure S19. Blood biochemical parameters acquired at different time intervals post injection of POCL. Related blood biochemistry indicators: albumin (ALB), alkaline phosphatase (ALP), alanine aminotransferase (ALT), aspartate aminotransferase (AST), blood urea nitrogen (BUN) and creatinine (CRE).

Reference

1. Pang Z, Lu W, Gao H, et al. Preparation and brain delivery property of biodegradable polymersomes conjugated with OX26. J. Controlled Release. 2008; 128: 120-7.