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Supporting Information

Mussel-inspired bioactive 3D-printable poly(styrene-butadiene-styrene) and the *in vitro* assessment for its potential as cranioplasty implants

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1. Experimental

1.1 Characterization

The morphology of ZIF-8, pZIF-8 and pHA/pZIF-8@SBS-QCSC surface was observed via the field emission scanning electron microscopy (FE-SEM) GeminiSEM 500 (Zeiss, Germany) and the element mapping of the pHA/pZIF-8@SBS-QCSC was characterized via the elements energy dispersive spectroscopic (EDS) analysis. A layer of gold (Au) was sputtered upon the sample to enhance the electroconductibility. The morphology of ZIF-8, pZIF-8, HA and pHA was also observed via transmission electron microscope (TEM) Tecnai G2 F20 S-TWIN (ThermoFisher, USA). The wettability of the SBS, SBS-Si, SBS-QCSC, pHA/pZIF-8@SBS-QCSC was identified via the contact angle goniometer ThetaFlex (Biolin Scientific, Finland). Both the water contact angle (WCA) and WCA after immersed in PBS for four weeks were detected. The Zeta potential and the particle size distribution of ZIF-8, pZIF-8, HA, pHA were measured via Zetasizer Nano ZS (Malvern, UK). The surface Zeta potential of pHA/pZIF-8@SBS-QCSC was also featured via SurPASS 3 (Anton Paar, Austria). The crystalline structures of ZIF-8, pZIF-8, HA, pHA were characterized via X-ray diffraction (XRD) X'Pert Pro MPD DY129 (Panalytical, Holland). The Zn release from ZIF-8 after immersed in PBS and MES for 48 h was detected via inductively coupled plasma optical emission spectrometer (ICP-OES) Avio 200 (PerkinElmer, USA).

3. Results and discussion

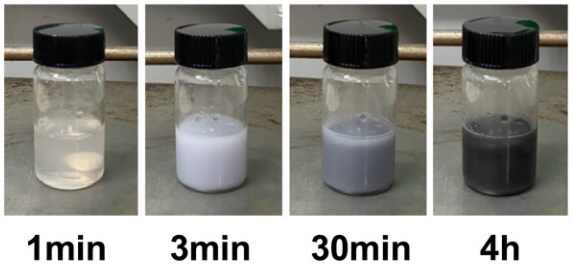

Figure S1. Photograph of color change during pZIf-8 synthesis.

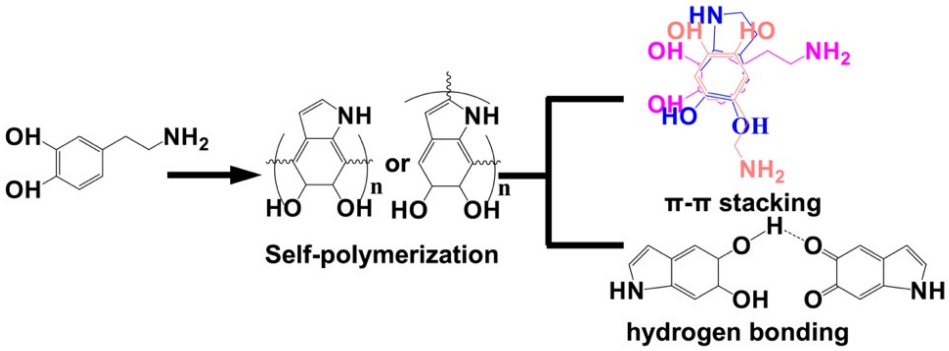

Figure S2. Schematic illustration of dopamine self-assembly.

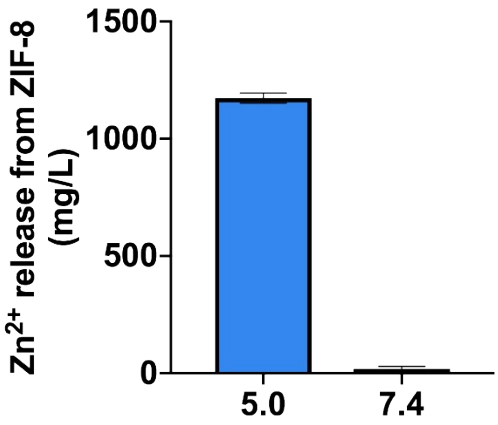

Figure S3. Released amount of Zn^{2+} at different pH (n=3).

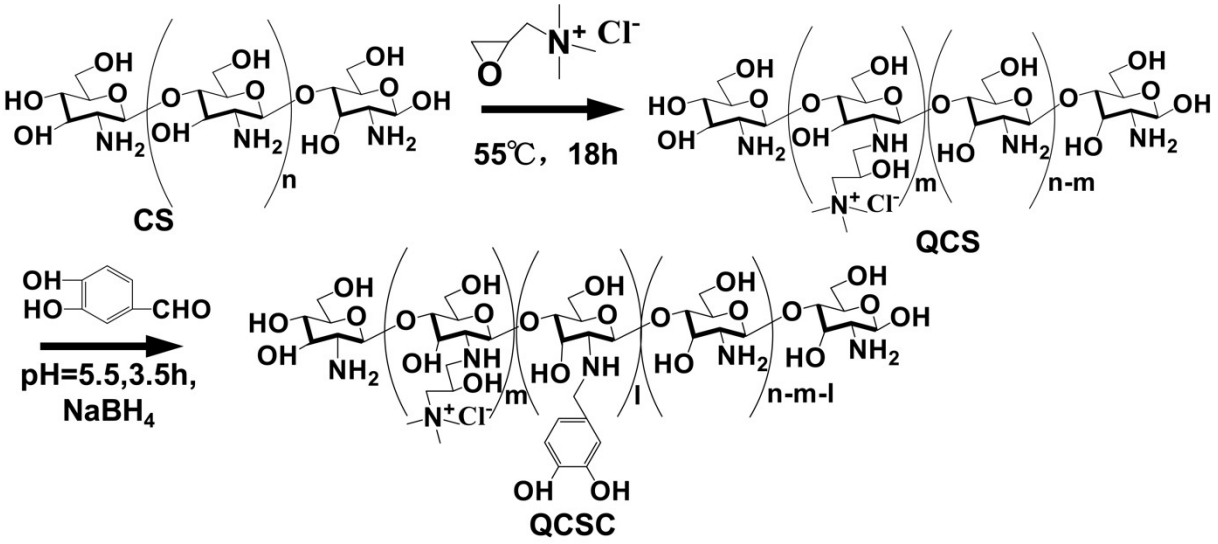

Figure S4. Schematic illustration of QCSC synthesis.

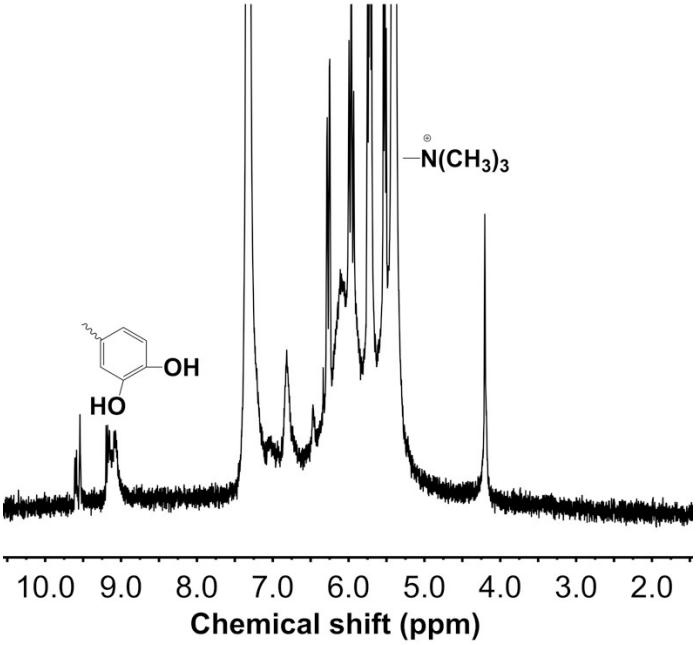

Figure S5. ^{1}H NMR of QCSC with DCl as solvent.

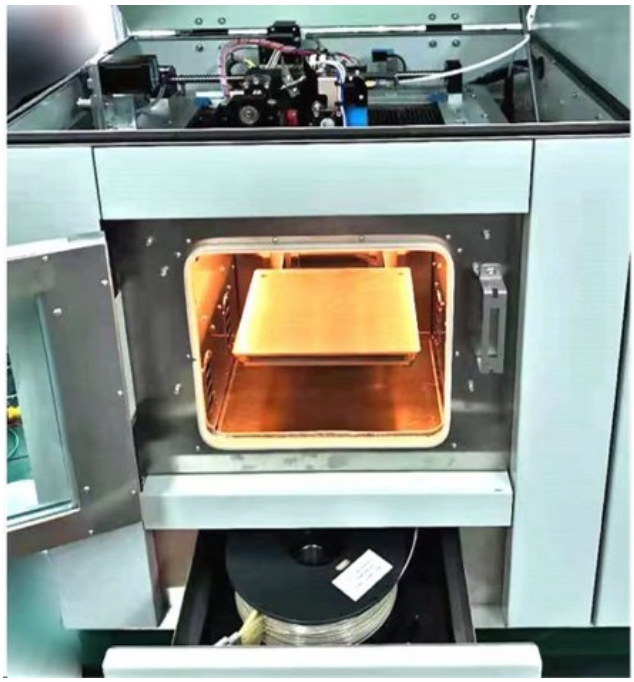

Figure S6. Photograph of 3D printing process of SBS using our self-made printer.

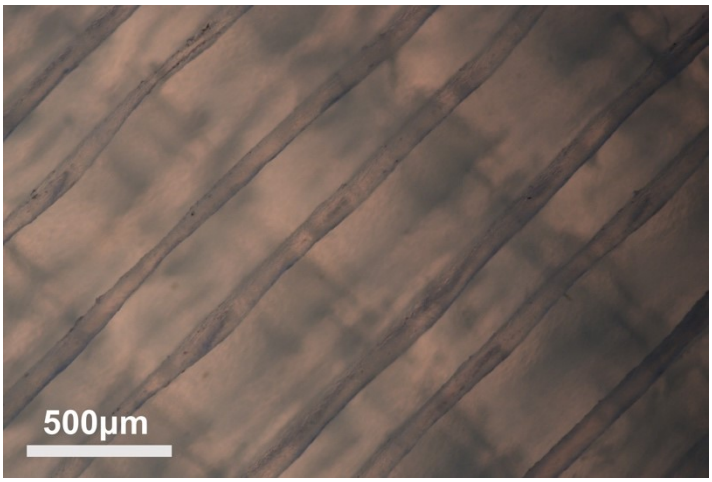

Figure S7. Microscopic image of the 3D-printed SBS.

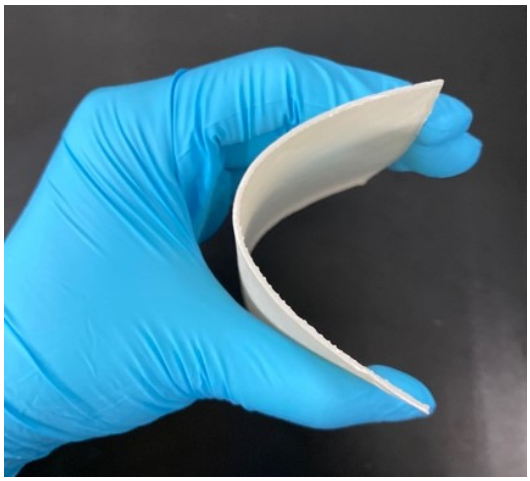

Figure S8. Photograph of the bent SBS substrate.

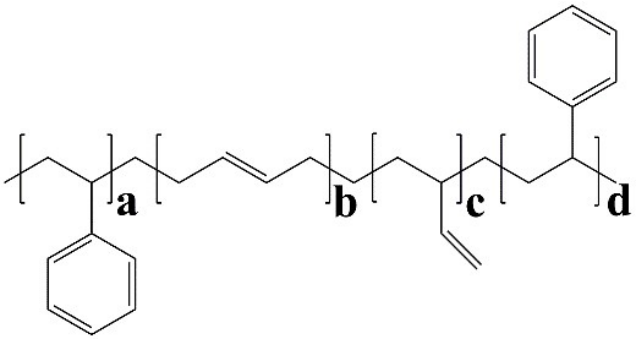

Figure S9. Chemical structure of SBS.

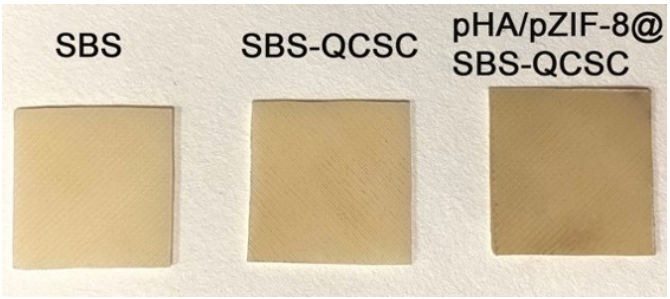

Figure S10. Photograph of the substrates.

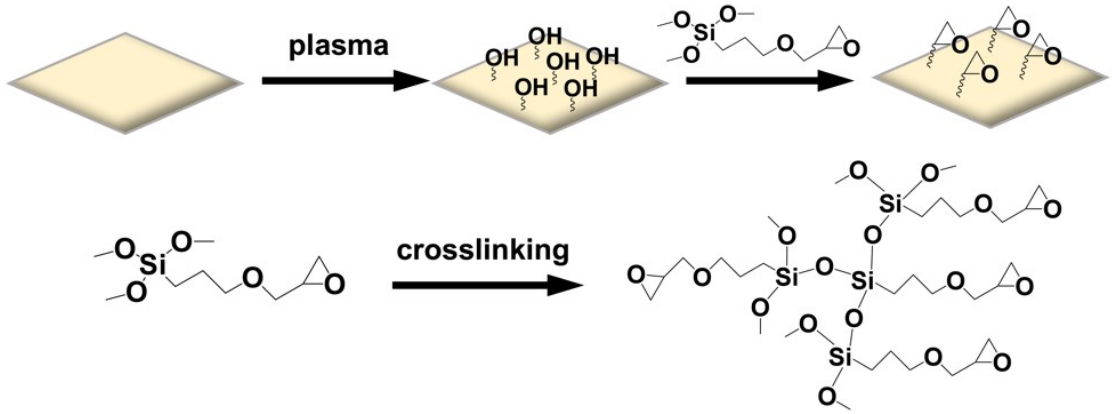

Figure S11. Schematic illustration of SBS-Si synthesis.

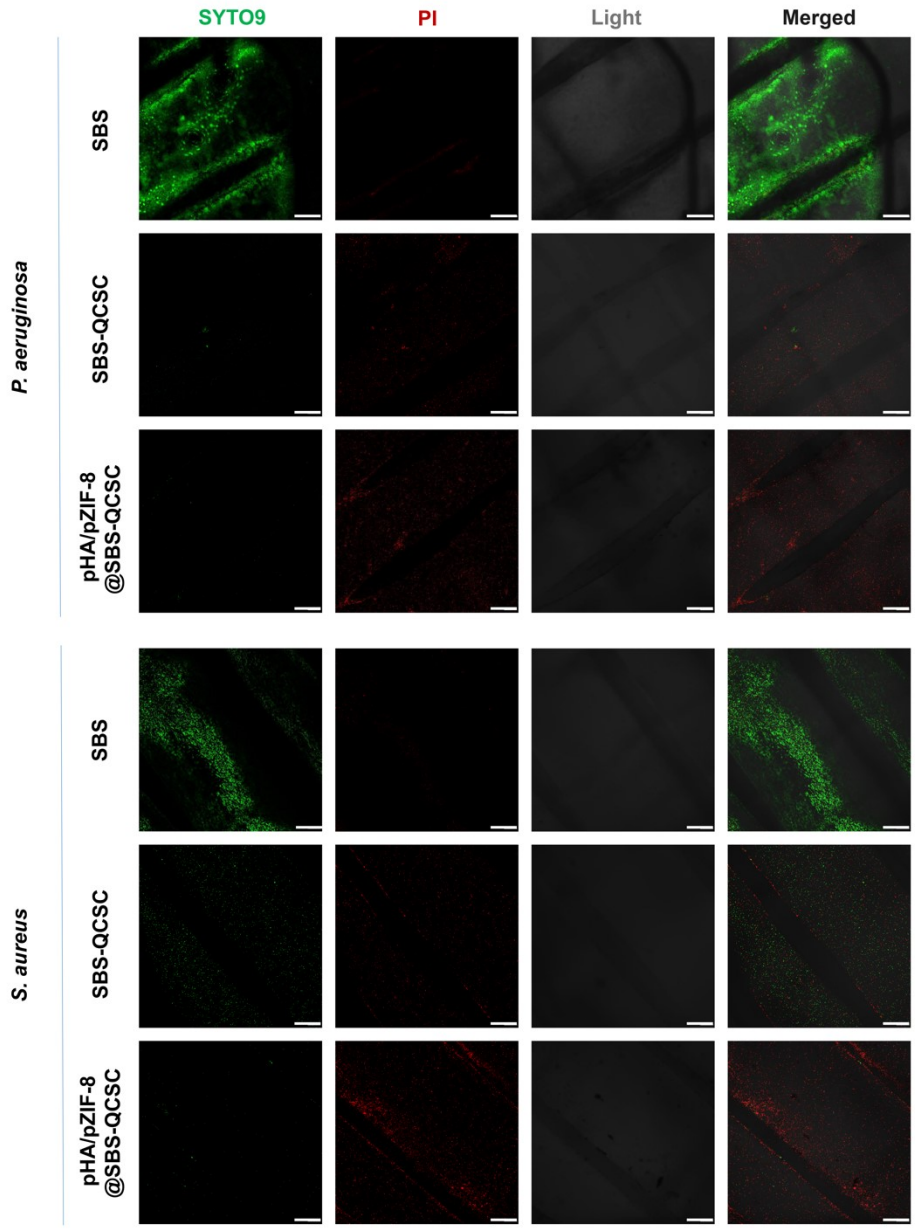

Figure S12. CLSM images of *P. aeruginosa* and *S. aureus* cultured on different substrates for 48 h. The LIVE/DEAD™ BacLight™ bacterial viability kit was applied to stain the bacteria. Scale bar = 100 μm.

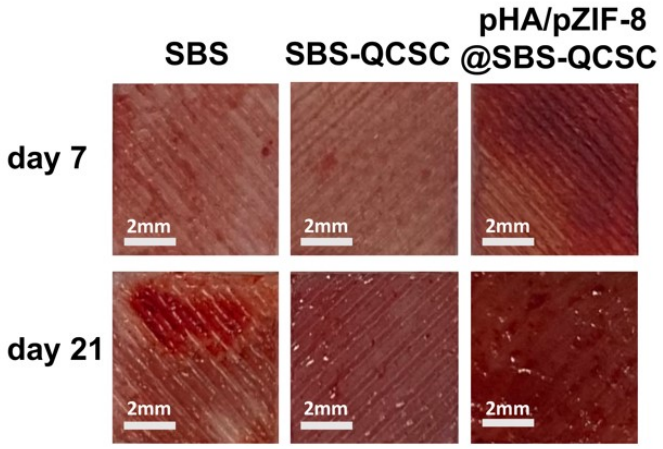

Figure S13. Photograph of Alizarin Red S on the substrates.

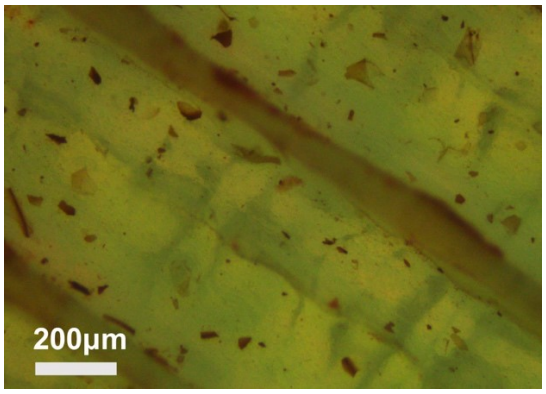

Figure S14. Light microscope capture of Alizarin Red S staining on the bare pHA/pZIF-8@SBS-QCSC substrate without cells.