Supporting Information

Table S1. The primer sequences used for RT-qPCR analysis

Gene	Forward primer	Reverse primer
GAPDH	5-TCACCATCTTCCAGGAGCGA	5-CACAATGCCGAAGTGGTCGT
COL II	5-AACACTGCCAACGTCCAGAT	5-CTGCAGCACGGTATAGGTGA
Aggrecan	5-AGGTCGTGGTGAAAGGTGTTG	5-GTAGGTTCTCACGCCAGGGA
SOX9	5-GGTGCTCAAGGGCTACGACT	5-GGGTGGTCTTTCTTGTGCTG
N-cadh	5-TCATCTTCGTTTCCATTGGA	5-TAAGAACTCTGTAAGTTTTGGC
IHH	5-GGAGGAGTCCTTGCATTATGAG	5-TAATACACCCAGTCGAAGCCG
Patched-1	5-AGCTGGGAGGAAATGCTGAA	5-ACGTGGGCCTTGGACTCGTA
Gli-1	5-ACCCCACCACCAGTCAGTAG	5-TGTCCGACAGAGGTGAGATG
MMP3	5-ATG GACCTTCTTCAGCAA	5-TCA TTATGTCAGCCTCTC
MMP13	5-AGGAGCATGGCGACTTCTAC	5-TAAAAACAGCTCCGCATCAA
Adamts-5	5-TGTCCTGCCAGCGGATGT	5-ACGGAATTACTGTACGGCCTAC
HIF-1α	5-GCCACCACTGACGATTAAAACC	5-GGTGATGTTGTGGCACTAGC
P62	5-AACAGAGGTGACCACCCTTCA	5-AGCACAGACTGGCTGGAAGTC
Atg5	5-CGTCCTGTGGCTGCAGATG	5-AAGGACACACTTCTTTGAGGAGATC
Atg12	5-TGCTGAAGGCTGTGGGAGAT	5-TGTTCGCTCTACAGCCCATTT
Atg16L1	5-CCACCAAACCGGCATGAG	5-CTTGCAGCTGGCTGTCATTC

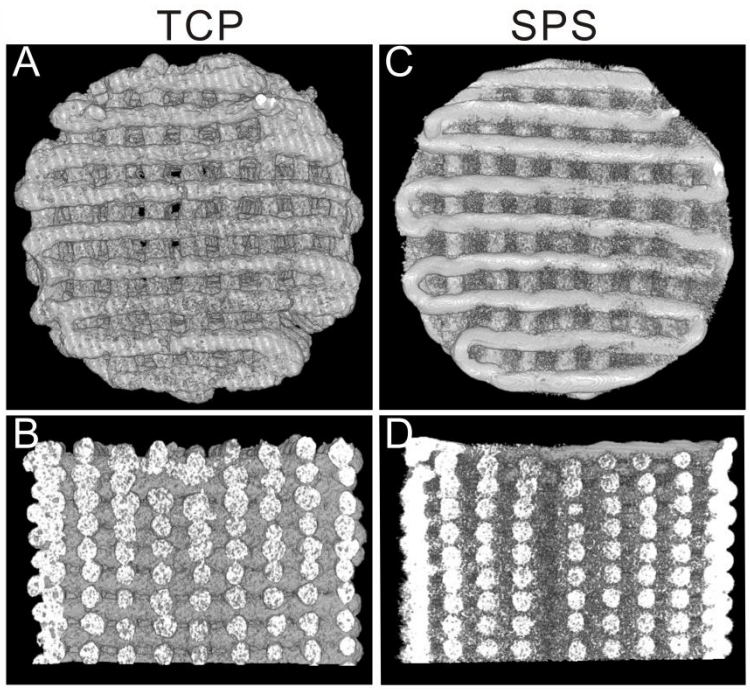

Figure S1. Micro-CT images of SPS scaffolds. (A) The top surface of TCP scaffold, (B) the vertical section of TCP scaffold, (C) the top surface of SPS scaffold, (D) the vertical section of SPS scaffold. The prepared 3D-plotted TCP and SPS scaffolds with controlled structure and uniform macropores.

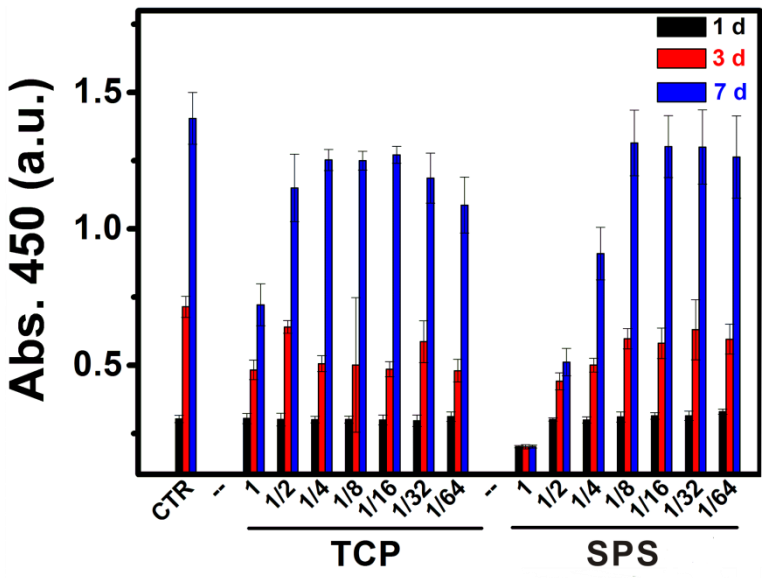

Figure S2. The proliferation of chondrocytes cultured with SPS extracts. The proliferation of chondrocytes cultured with SPS extracts has no significant distinction with that of TCP extracts. Repeat number: n=6. (*p<0.05, **p<0.01, ***p<0.001).

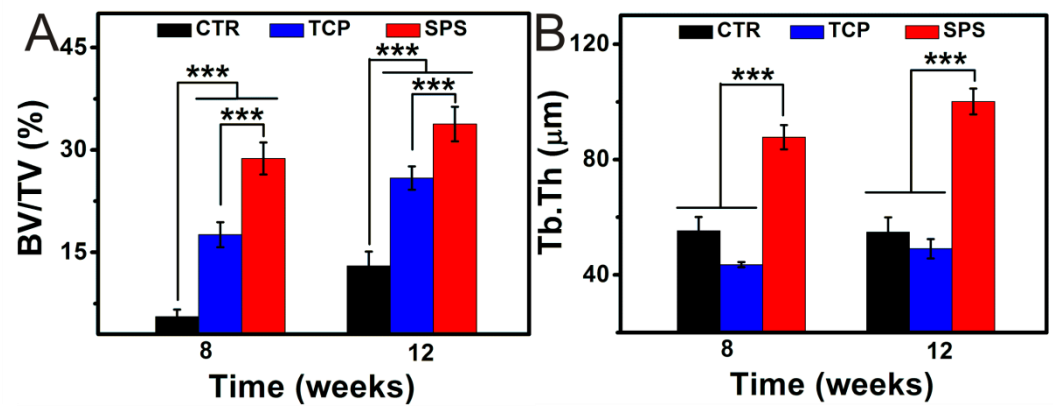

Figure S3. Micro-CT imaging analysis of the defects at 8 and 12 weeks of post-surgery. (A) BV/TV, (B) Tb.Th. Micro-CT analysis of defect space displayed significantly greater level of bone formation and quality in SPS group, as compared to that of CTR and TCP groups. Repeat number: n=6. (*p<0.05, **p<0.01, ***p<0.001).

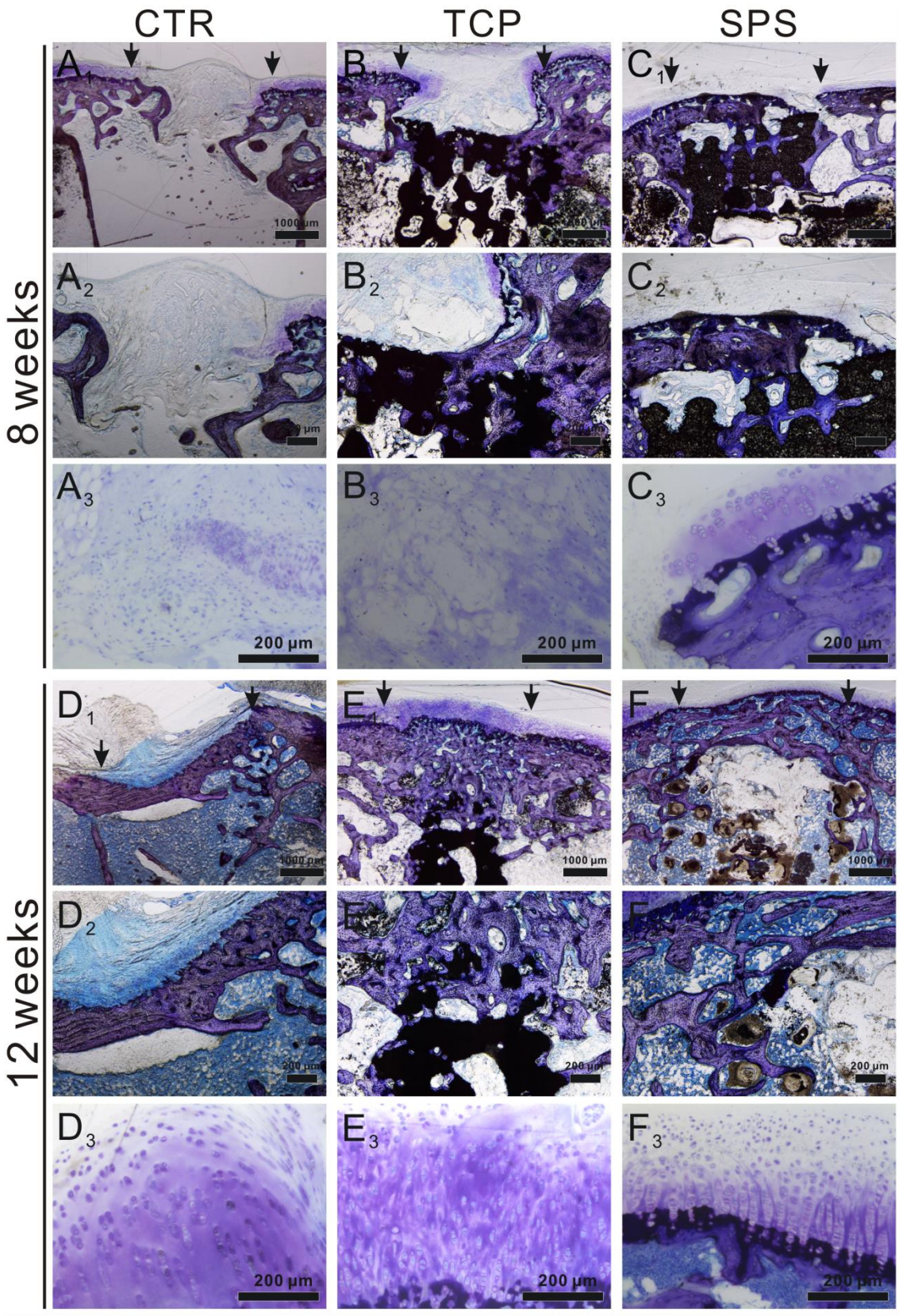

Figure S4. TheToluidine blue stained analysis at 8 and 12 weeks of post-surgery. (A_1-C_3) The toluidine blue staining for 8 weeks. A_{1-3}: CTR group, B_{1-3}: TCP group, C_{1-3}: SPS group. (D_1-F_3) The toluidine blue staining for 12 weeks. D_{1-3}: CTR group, E_{1-3}: TCP group, F_{1-3}: SPS group. Images of the bottom row represent the top row images at higher

magnification. Black arrows indicated demarcation of the defect. At 8 weeks, a mixture of fibrous tissue and neo-bone tissue was found in CTR and TCP groups, while considerable amount of neo-bone tissue was found in the SPS group. At 12 weeks, partial repair of the defect with hyaline cartilage and subchondral bone was observed at the periphery of the defect in the CTR group, while the surfaces of the defect region in TCP and SPS groups were covered with well-integrated hyaline cartilage tissue. However, the TCP group displayed disordered and uneven structure between cartilage and neo-bone in subchondral bone, while the SPS group showed an orderly continuous and smooth structure between cartilage and neo-bone in subchondral bone. Briefly, the SPS group significantly promoted the cartilage and subchondral bone regeneration as compared to the CRT and TCP groups.

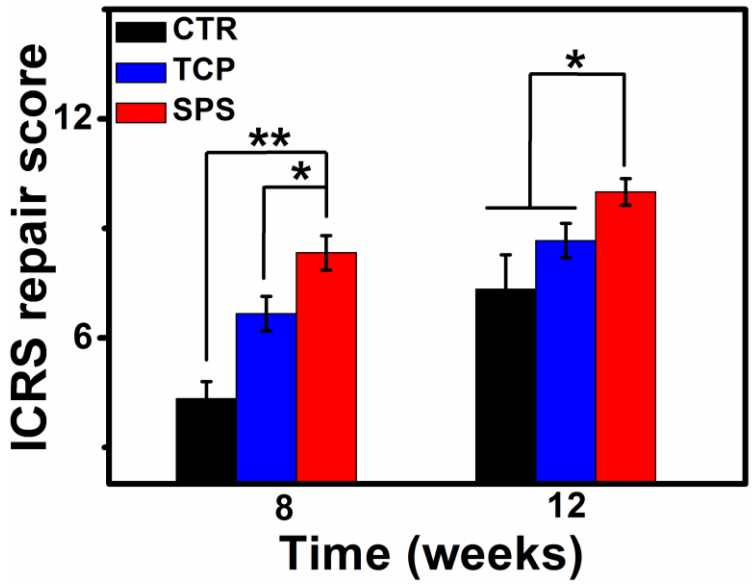

Figure S5. The ICRS scores of 8 and 12 weeks of post-surgery. Blinded quantity of ICRS scores for CTR, TCP and SPS groups by three investigators was collected and the result displayed that the ICRS score of SPS group was distinctly enhanced as compared to the CTR and TCP groups. Repeat number: n=6. (*p<0.05, **p<0.01, ***p<0.001).