Figure S1. (a-b) The porous tantalum used for in vivo experiment; SEM micrographs of HO-Ta (c), MO-Ta (d) and LO-Ta (e); (f) Representative SEM images of MC3T3-E1 cells after cultured on different Ta samples for 3 and 14 days showing various cellular morphology spreading with increased culturing time; The representative image of bone defect before (g) and after (h) porous tantalum was implanted.

Figure S2. In vivo biocompatibility of Ta samples with different oxygen contents: (a-h) hematological parameter values for the control group and Ta groups did not differentiate significantly, (i-n) serum biochemical values of liver and kidney for the control group and Ta groups did not differentiate significantly.

Figure S3. Representative histological images of vital organs (heart, liver, spleen, lung and kidney) stained with H&E dye at 8 weeks after surgery, showing no significant histopathological alterations in the Ta groups compared with the control group, scale bar=50 um.