## A Novel Multifunctional Carbon Aerogel Coated Platform for Osteosarcoma Therapy and Enhanced Bone Regeneration

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**Fig. S1.** The digital pictures of (a)  $\beta$ -TCP and  $\beta$ -TCP-C discs ( $\varphi 10 \times 2 \text{ mm}^3$ ) used *in vitro*, (b)  $\beta$ -TCP and  $\beta$ -TCP-C scaffolds ( $\varphi 5 \times 2 \text{ mm}^3$ ) and (c)  $\beta$ -TCP and  $\beta$ -TCP-C scaffolds ( $2 \times 2 \times 6 \text{ mm}^3$ ) used *in vivo*.



**Fig. S2**. Characterizations of  $\beta$ -TCP-C scaffolds. (a) SEM images of  $\beta$ -TCP and  $\beta$ -TCP-C scaffolds (yellow arrows, carbon aerogel). (b) The morphology and corresponding element mapping on the fracture of  $\beta$ -TCP-C scaffolds.



Fig. S3. Deconvoluted Raman spectroscopies of  $\beta$ -TCP-C.



Fig. S4. The surface topography of  $\beta$ -TCP and  $\beta$ -TCP-C discs measured with AFM.



Fig. S5. The HE staining results of major organs excised on day 14 after implantation.



**Fig. S6.** The evaluation of protein adsorbing activity. (a) The fluorescence images of Alex Fluor 594 conjugated Goat Anti-Mouse IgG on the surface of  $\beta$ -TCP and  $\beta$ -TCP-C discs, respectively. (b) The quantitive detection of BSA adsorbed on the surface of  $\beta$ -TCP and  $\beta$ -TCP-C discs (n = 3, \*p < 0.05).



**Fig. S7.** The biodegradation behavior of  $\beta$ -TCP and  $\beta$ -TCP-C discs after soaking in Tris-HCl solution (pH 7.4) up to 28 days.



Fig. S8. The SEM images of BMSCs cultured on  $\beta$ -TCP and  $\beta$ -TCP-C discs for 6 h.



Fig. S9. The evaluation of calcium nodules formed on  $\beta$ -TCP and  $\beta$ -TCP-C discs after culturing of BMSCs for 21 days. (a) The images of Alizarin Red S stained calcium nodules. (b) Quantitive detection of Alizarin Red S dyed on calcium nodules (n = 3, \*p < 0.05).



**Fig. S10.** The schematic diagrams of (a) construction of full-thickness bone defects on calvaria region and (b) implantation of  $\beta$ -TCP and  $\beta$ -TCP-C scaffolds.