**Supplementary experiment 1**

**Fabrication of various alginate-based fibers by changing the concentration of inorganic particles (hydroxyapatite and silica particle) and studied the effect of different concentration of $SiO_2$/HAP on mechanical tests. The results of the supplementary experiments have been described as follow and added as the supplementary file of this manuscript.**

"As shown in Figure S1 and S2, it could be concluded that the breaking stress of alginate-based fibers was positive to the concentration of $SiO_2$ or HAP, whereas the elongation at rupture was negative to the concentration of $SiO_2$ or HAP. The more content of inorganic particles in the fibers resulted in the more quantity of insolvable precipitatation deposited on the surface of the alginate-based fibrous dressings, meaning the increase of fiber stiffness. Therefore, the breaking stress increased with the content of the incorporation of inorganic particles while the contrary of the elongation at rupture. In addition, the maximum contents of inorganic particles were 100 μg/ mL, which was attribute to the significant cytotoxicity of the higher content of inorganic particles in the fibrous dressings. "

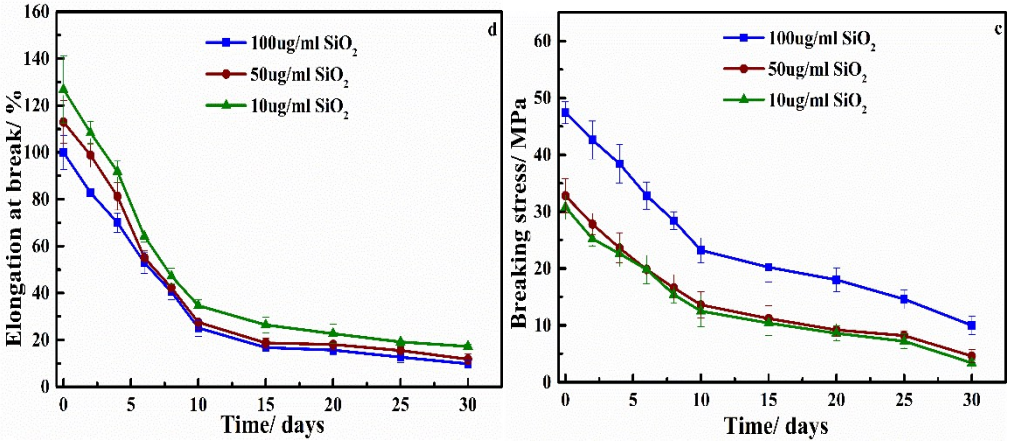


Figure S1 Mechanical performance of alginate-based fibers containing various concentration of $SiO_2$, (d) Elongation at rupture and (c) Breaking stress

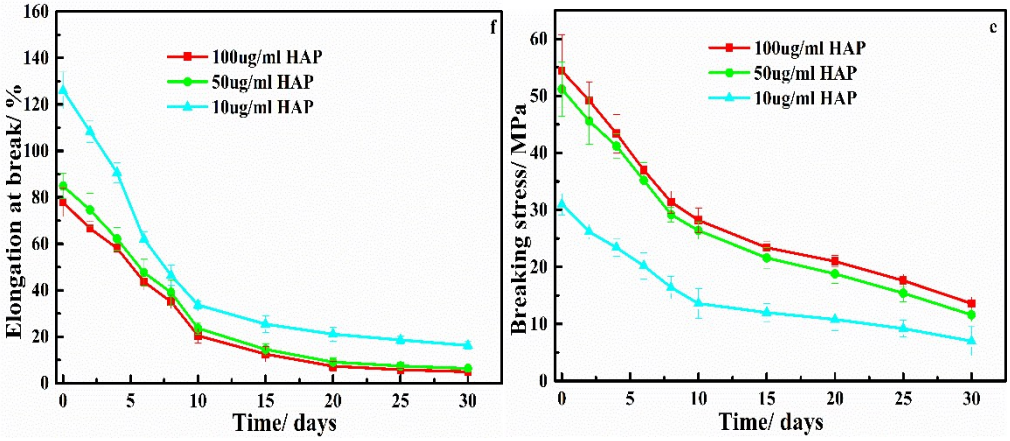


Figure S2 Mechanical performance of alginate-based fibers containing various concentration of HAP, (f) Elongation at rupture and (e) Breaking stress

**Supplementary experiment 2**

**The appearance of alginate-based fibers has been added as the supplementary file of this**

**manuscript.**

All the fibers appearance have been added and exhibited in the following figures. Alginate-based fibers prepared in the research displayed the similar appearance as follow.

Figure S3 Fibers appearance

**Supplementary experiment 3**

**The morphology of three kinds of fibers have been provided more clear magnification (figure caption) as follow and added as the supplementary file of this manuscript.**

The following figure was the morphology of three types of fibers. Pure alginate fibers displayed tiny crack, which was triggered inevitably during the preparation process. SA-HAP and SA-Si composite reinforced fibers exhibited lots of small and round crystal-like homogeneous particles attached to the fibrous surface. It demonstrated that the inclusion of inorganic nano-silica or/and hydroxyapatite particles into the alginate deposited evenly on the surface of fibers".

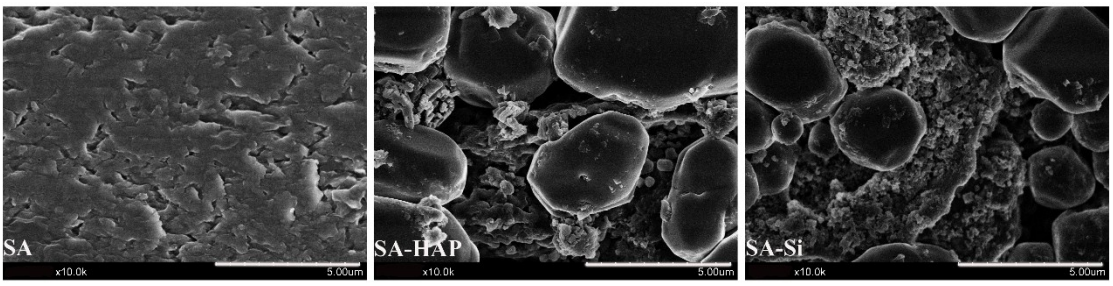


Figure S4 The morphology of SA/ SA-HAP/ SA-Si

**Supplementary experiment 4**

**The research on the plasticity of three types of fibers has been added as a supplementary file in the manuscript.**

The plasticity of fibers could be expressed by the stress-strain curves. As shown in Figure S5, it could be seen that alginate-based fiber containing nano-silica/ hydroxyapatite particles exhibited a longer curves compared to the pure alginate fiber, which meant the better plasticity properties than pure alginate fibers. The inorganic particles were embedded into the alginate-based fibers during the preparation process, which improved the weak link of fibers and enhanced the plasticity of fibers. In addition, the inclusion of silica/ hydroxyapatite particles into the alginate-based fibers, which as the crystal-like covered evenly on the surface of fibers. That resulted in a bigger

crystallinity, which increased the strength and plasticity of fibers.

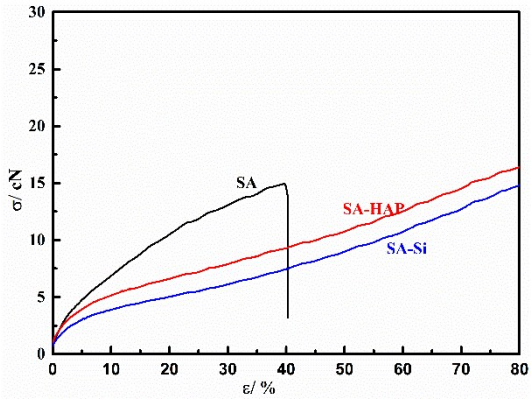


Figure S5 Stress-strain curves of SA/ SA-HAP/ SA-Si

**Supplementary experiment 5**

**The research on thermal stability (TGA) of alginate-based fibers has been added as a supplementary file in the manuscript and described as follow.**

As shown in Figure S6, three types of fibers exhibited the similar TGA curves, which meant that the inorganic particles had no significant effect on the thermal stability. It could be seen that the thermal decomposition temperature of three types of fiber were about 250℃.

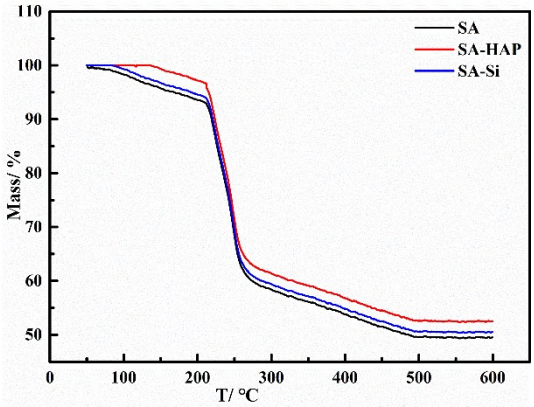


Figure S6 TGA curve of alginate fiber