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Engineering magnetically responsive tropoelastin spongy-like hydrogels for soft tissue regeneration

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Supporting Information

Compression and magnetic responsiveness of bioengineered spongy-like hydrogels

Video S1 (cross-linked tropoelastin) and Video S2 (magnetically responsive tropoelastin) show the compression of the samples in hydrated state at room temperature using a tweezer. Following *in situ* precipitation reaction to dope tropoelastin spongy-like hydrogels with magnetic nanoparticles, the samples were left in PBS solution for 48 h at 4˚C. Then, samples were placed at room temperature, removed from PBS solution and squeezed with a tweezers until both end of the utensil nearly touched each other. After releasing the pressure, it was possible to observe that both samples returned to their original shape, highlighting that crosslinking reaction, as well as the presence of magnetic nanoparticles do not present any observable negative effect in the intrinsic elasticity of tropoelastin.

Video S3 demonstrates the magnetic responsiveness of magnetic tropoelastin (about 5 sec) in the presence of an external magnetic field.

Circular dichroism analysis

The secondary structure of tropoelastin in the bioengineered spongy-like hydrogels is demonstrated after crosslinking reaction with vapour glutaraldehyde overnight at room temperature followed by hydration with PBS at 37˚C (Figure S1-B) and after quenching the crosslinked hydrogels in 0.2M glycine overnight at room temperature (Figure S1-C). Figure S1B shows that crosslinking tropoelastin with glutaraldehyde induces a shift of the negative band from 200 to 240 nm with the appearance of a large positive band from 190 to 228 nm. Figure S1C shows that quenching crosslinked tropoelastin with 0.2 M glycine triggers a subtle shift of the negative band from 240 to 235 nm.

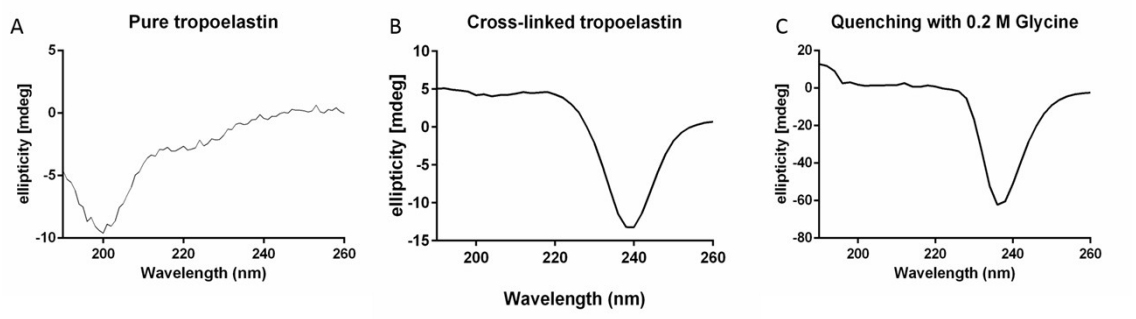

Figure S1 – Circular dichroism spectra obtained in hydrogel form for A) pure tropoelastin, B) crosslinked tropoelastin and C) after glycine quenching.