Supporting information

Degradable silk-based soft actuator with magnetic responsiveness

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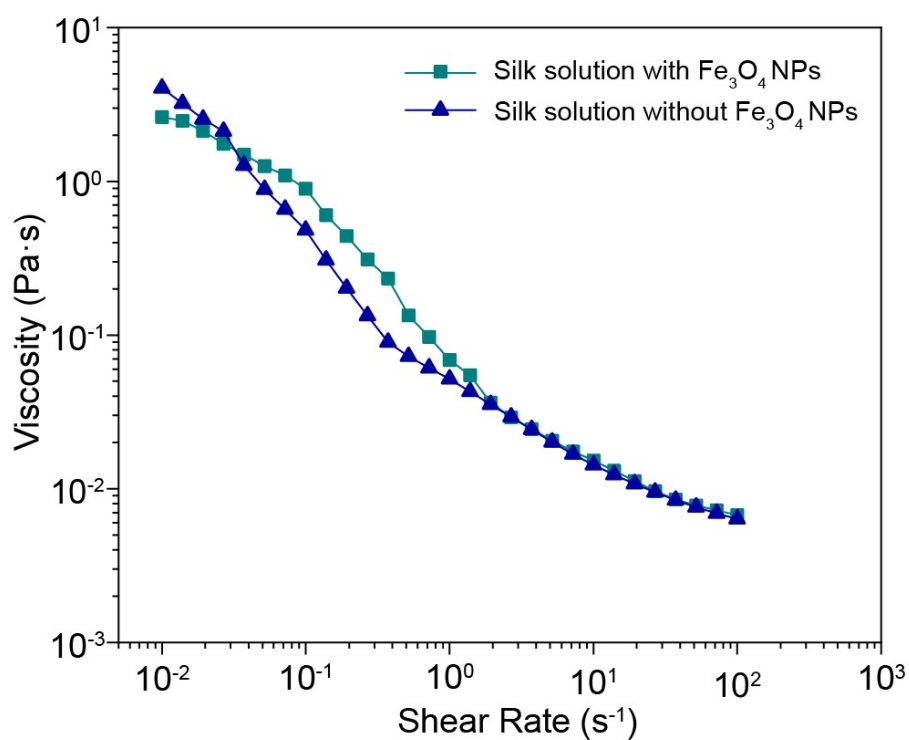[3] Westlake Laboratory of Life Sciences and Biomedicine, Hangzhou 310024, China

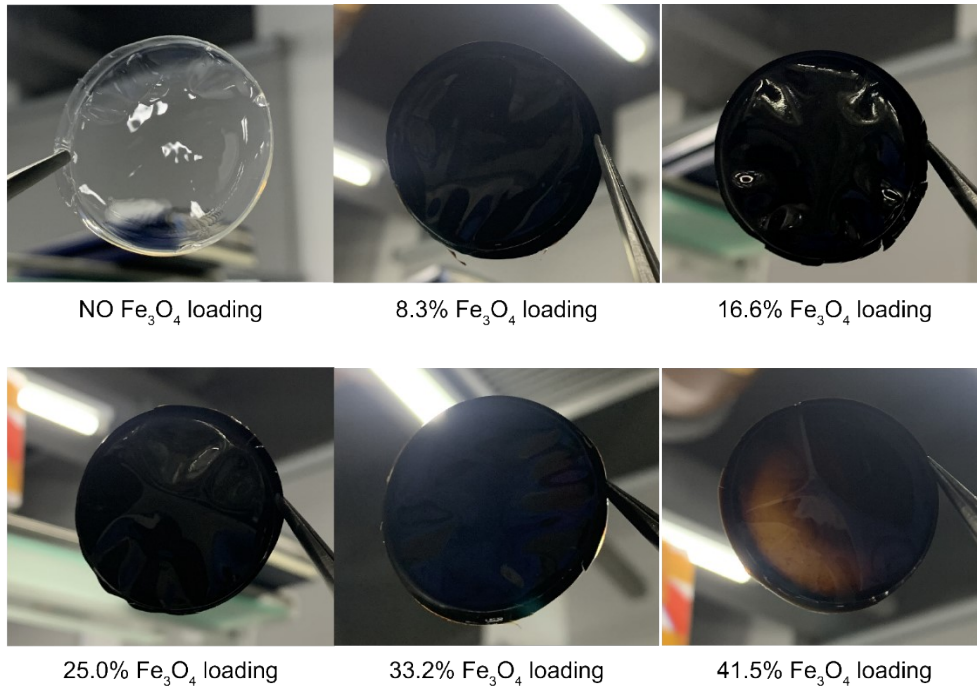**Fig. S1** Viscosity-shear rate profiles of silk solutions with or without magnetic Fe_3O_4 NPs.

NO Fe$_3$O$_4$ loading   8.3% Fe$_3$O$_4$ loading   16.6% Fe$_3$O$_4$ loading

25.0% Fe$_3$O$_4$ loading   33.2% Fe$_3$O$_4$ loading   41.5% Fe$_3$O$_4$ loading

Fig. S2 The photographs of magnetic silk films with different Fe$_3$O$_4$ NPs loading percent.
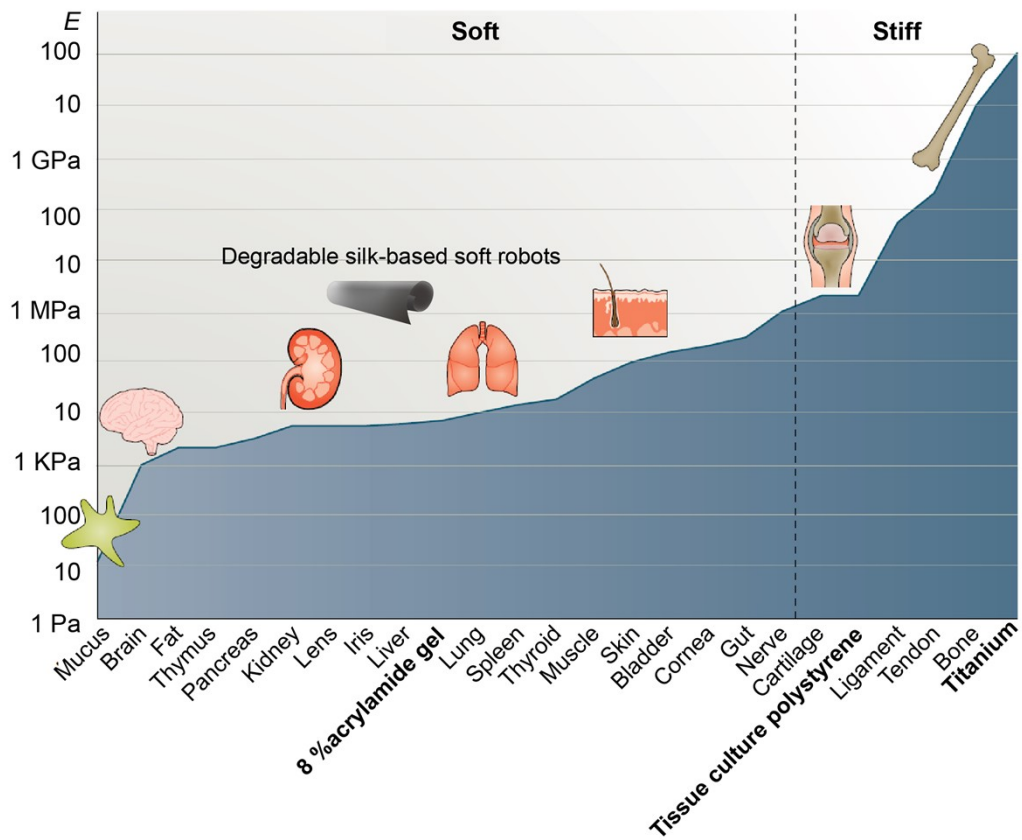

Fig. S3 The summary of Young's moduli (E) of different tissues and degradable silk-based soft robots fabricated in this study. Reproduced with permission.[1] Copyright 2020, Springer Nature.
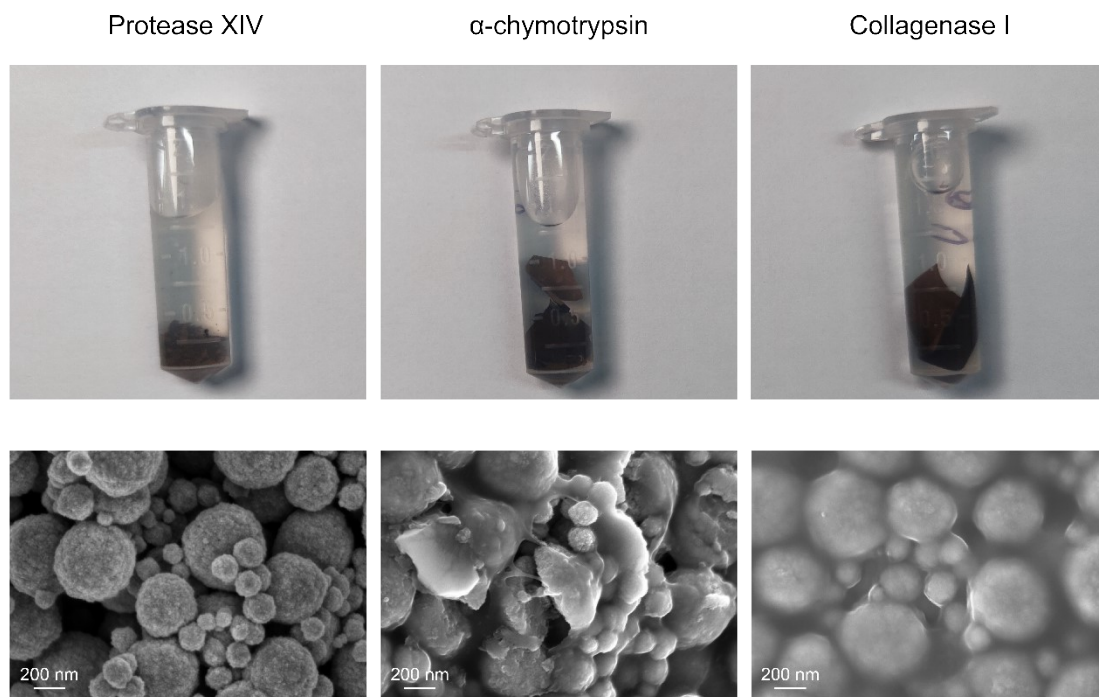
Fig. S4 The photographs and SEM images of magnetic silk films after incubating in protease XIV, α-chymotrypsin, and collagenase I for 3 days.
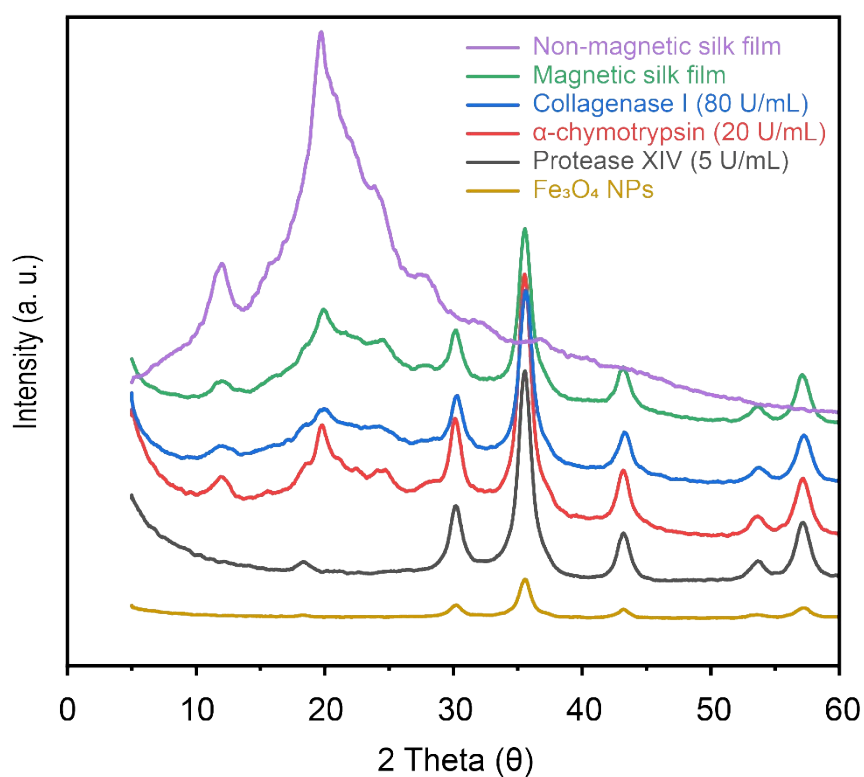

Fig. S5 The XRD patterns of non-magnetic silk film, magnetic silk film and magnetic silk films after incubating in protease XIV, α-chymotrypsin, and collagenase I for 3 days.
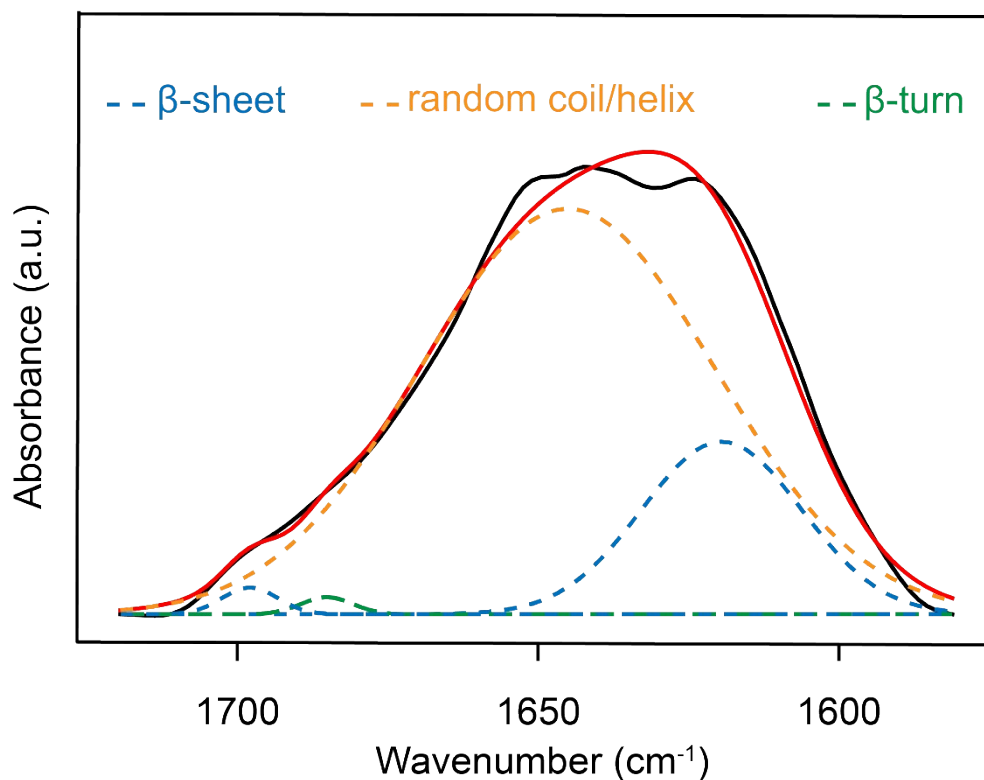
Fig. S6 FTIR spectrum of the welded magnetic silk film.

Table S1. Summary of the mechanical properties of the silk films

	Magnetic silk film (dry)	Non-magnetic silk film (dry)	Magnetic silk film (wet)	Non-magnetic silk film (wet)
Ultimate strength (MPa)	14.3 ± 1.9	13.4 ± 1.5	1.88 ± 0.23	1.65 ± 0.20
Strain at failure (%)	154 ± 24	165 ± 26	224 ± 14	454 ± 84
Young' modulus (MPa)	195.7 ± 53.1	324.3 ± 69.5	4.89 ± 0.69	2.34 ± 0.33
Toughness (MJ/m³)	20.1 ± 5.1	20.3 ± 3.5	3.23 ± 0.33	5.27 ± 1.30

Reference

1. Guimarães, C.F., Gasperini, L., Marques, A.P. et al. The stiffness of living tissues and its implications for tissue engineering. *Nat. Rev. Mater.* **5**, 351–370 (**2020**).