

Supplementary Material

Intrafibrillar Calcium Carbonate Mineralization of Electrospinning Polyvinyl Alcohol/Collagen Films with Improved Mechanical and Bioactive Properties

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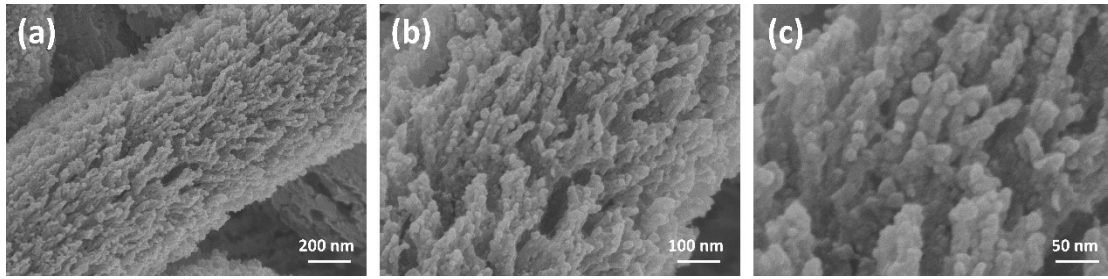


Figure S1. SEM image of intrafibrillar mineralization of PVA/Col-CaCO₃ with higher magnifications.

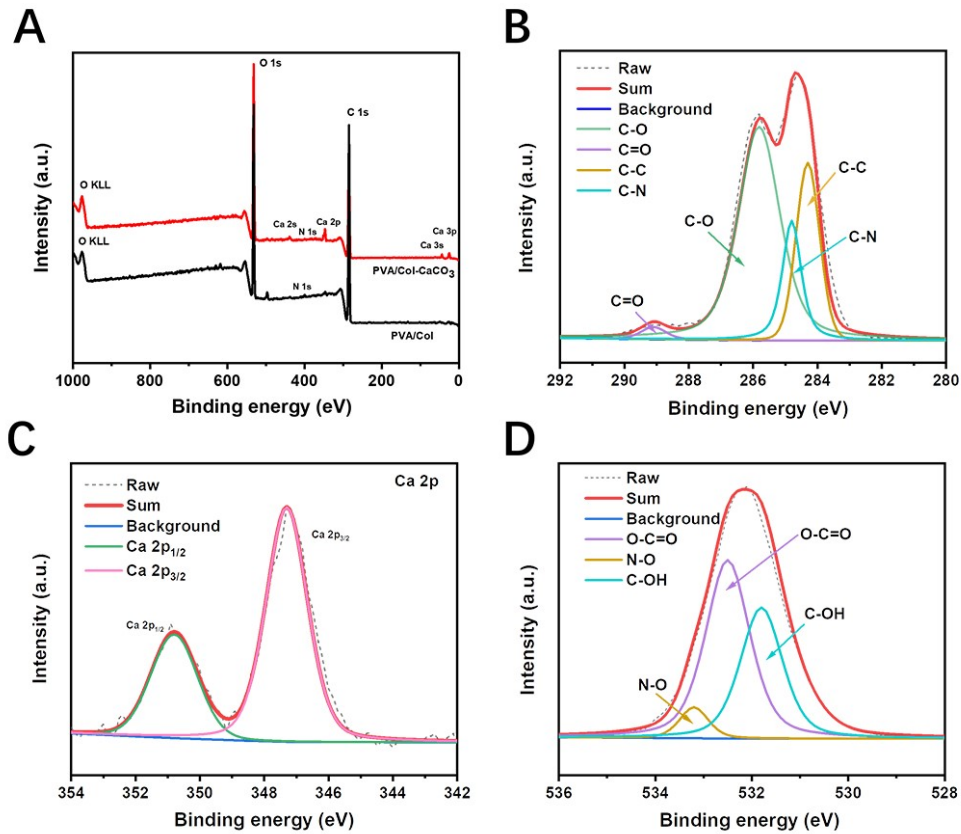


Figure S2. XPS spectra of PVA/Col and PVA/Col-CaCO₃. (A) Full spectrum, (B-D) high resolution deconvoluted spectra of C 1s, Ca 2p and O 1s, respectively.

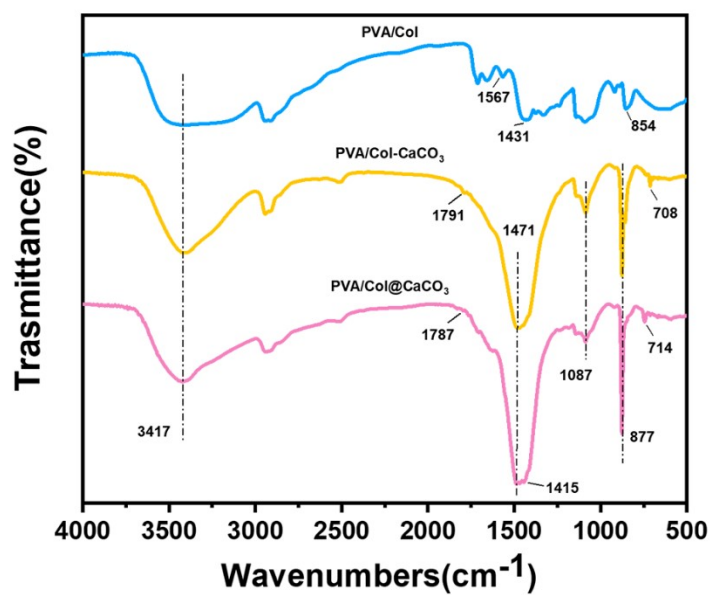


Figure S3. FTIR spectra of PVA/Col, PVA/Col-CaCO₃ and PVA/Col@CaCO₃.

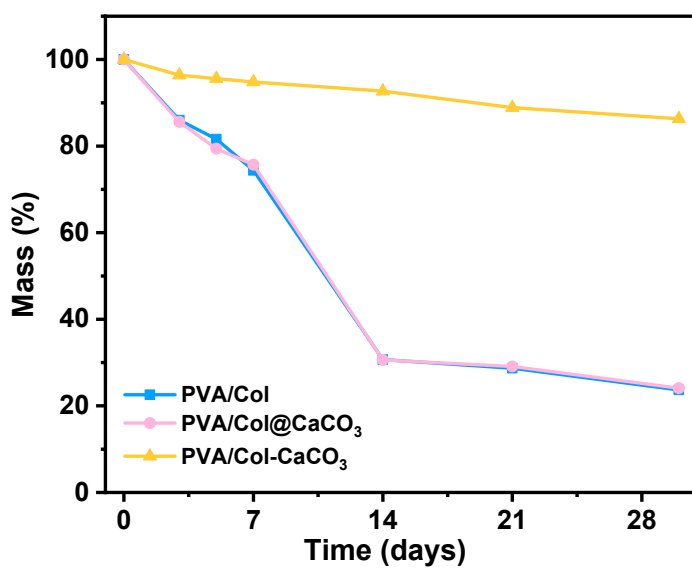


Figure S4. Degradation profile of the PVA/Col, PVA/Col@CaCO₃ and PVA/Col-CaCO₃ in PBS containing collagenase.

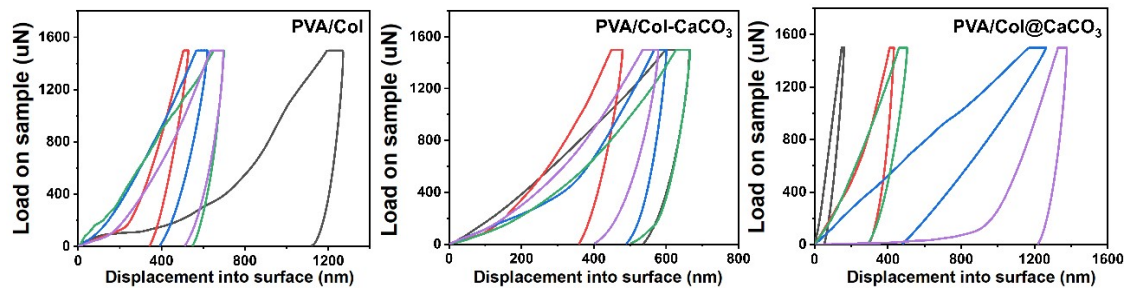


Figure S5. Mechanical properties of PVA/Col, PVA/Col-CaCO₃ and PVA/Col@CaCO₃ tested via nanoindentation tests. Different colors of the curves represent different test points from the sample within the same area.

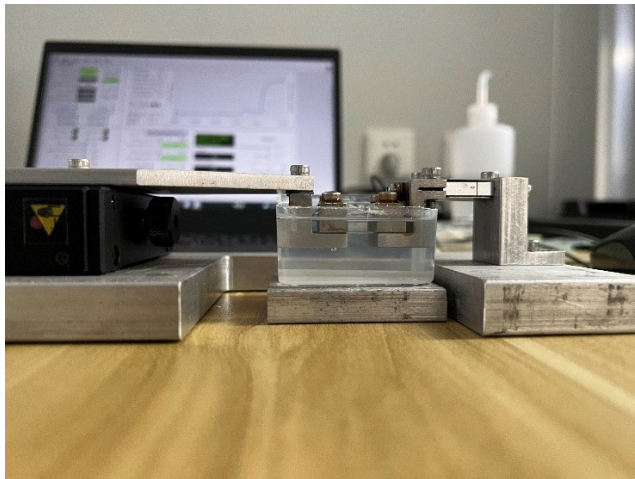


Figure S6. A self-designed mechanical testing setup.

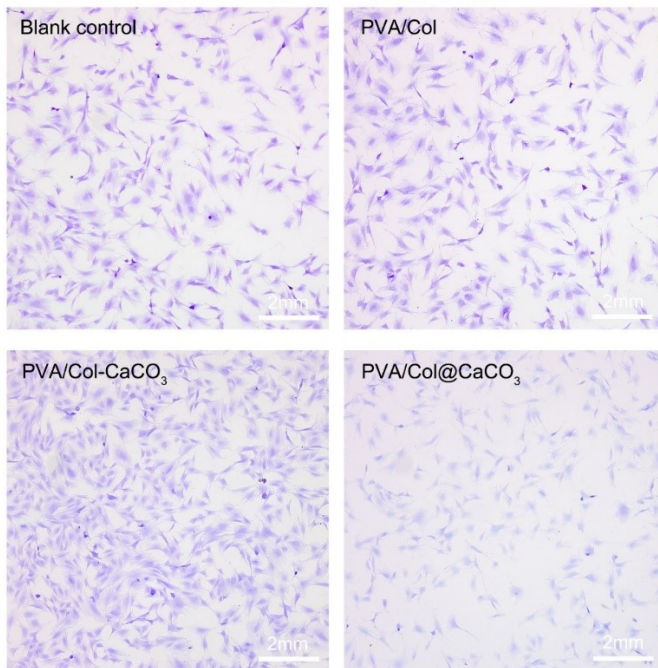


Figure S7. Crystal violet staining of BMSCs cultured with various samples for 1 day.

Table S1. Mechanical properties of bioactive-films in previous work.

Number	Sample	Hardness	Ref.
1	PVA/HA	20 kPa~200 kPa	[1]
2	Coll_pNE_Ca	37.6 MPa	[2]
3	PVA-COL scaffolds	3.581 MPa	[3]
4	Aligned collagen scaffolds	31.02 ± 3.22 MPa	[4]
5	PCL/COL scaffolds	16.3 MPa	[5]
6	PVA/Col-CaCO ₃	211.6 ± 0.06 MPa	This work

Reference

- [1] S.H. Oh, D.B. An, T.H. Kim, J.H. Lee, *Acta Biomater.* 2016;35:23-31.
- [2] C. Dhand, S.T. Ong, N. Dwivedi, et al., *Biomaterials.* 2016;104:323-338.
- [3] Z. Wu, B. Kong, R. Liu, W. Sun, S. Mi, *Nanomaterials.* 2018;8(2):124.
- [4] Y. Wang, M. Yao, J. Zhou, et al., *Biomaterials.* 2011;32:6737-6744.
- [5] V. Beachley, R.G. Hepfer, E. Katsanevakis, N. Zhang, X. Wen., *Bioengineering.* 2014;1:114-133.