Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Highly Aligned Hierarchical Intrafibrillar Mineralization of Collagen Induced by Periodic Fluid Shear Stress

Tianming Du [a], Xufeng Niu [a,b,c*], Sen Hou [a,b], Menghan Xu [a], Zhengwei Li [a], Ping Li [a,b], Yubo Fan [a,b,d*].

[a.] Key Laboratory for Biomechanics and Mechanobiology of Ministry of Education, School of Biological Science and Medical Engineering, Beihang University, Beijing 100083, China.

[b.] Beijing Advanced Innovation Center for Biomedical Engineering, Beihang University, Beijing 100083, China.

[c.] Research Institute of Beihang University in Shenzhen, Shenzhen 518057, China.

[d.] Beijing Key Laboratory of Rehabilitation Technical Aids for Old-Age Disability, National Research Center for Rehabilitation Technical Aids, Beijing 100176, China.

***Corresponding authors**.

Xufeng Niu. Address: School of Biological Science and Medical Engineering, Beihang University, No. 37 XueYuan Road, Haidian District, Beijing 100083, China. E-mail: nxf@buaa.edu.cn

Yubo Fan. Address: School of Biological Science and Medical Engineering, Beihang University, No. 37 XueYuan Road, Haidian District, Beijing 100083, China. E-mail: yubofan@buaa.edu.cn

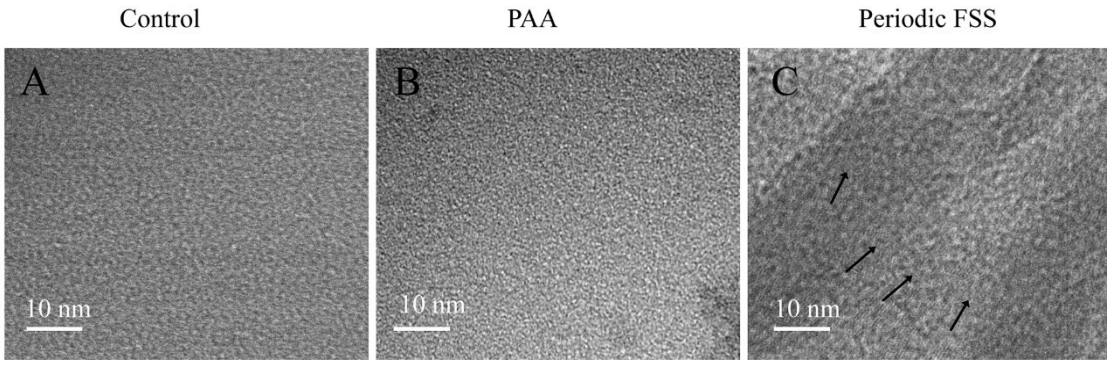

Fig. S1. High magnification TEM images of ACP under the conditions of control (A), PAA (B) and periodic FSS (C) for 2 h. ACP produces crystal lattice line under the action of periodic FSS (arrows), which is indicative of transition ACP into HA crystal.

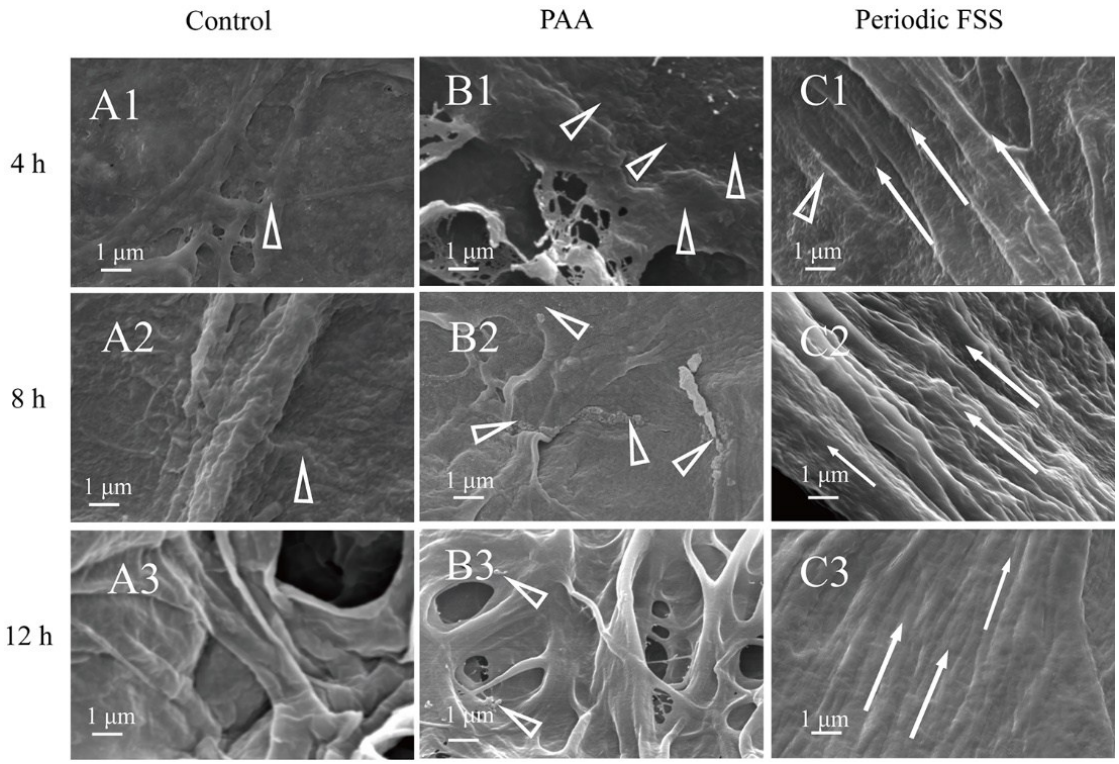

Fig. S2. SEM characterization to show the surface morphology of mineralized collagen under the condition of control (A), PAA (B) and periodic FSS (C) for 4 (1), 8 (2) and 12 h (3). ACP attaches on the surface of collagen fibers in the control group and small-sized spherical ACP particles appear in the presence of PAA (triangles). Compared with the entangled fiber morphology in these two groups, the mineralized collagen fibers are oriented under the action of periodic FSS (fine arrows).

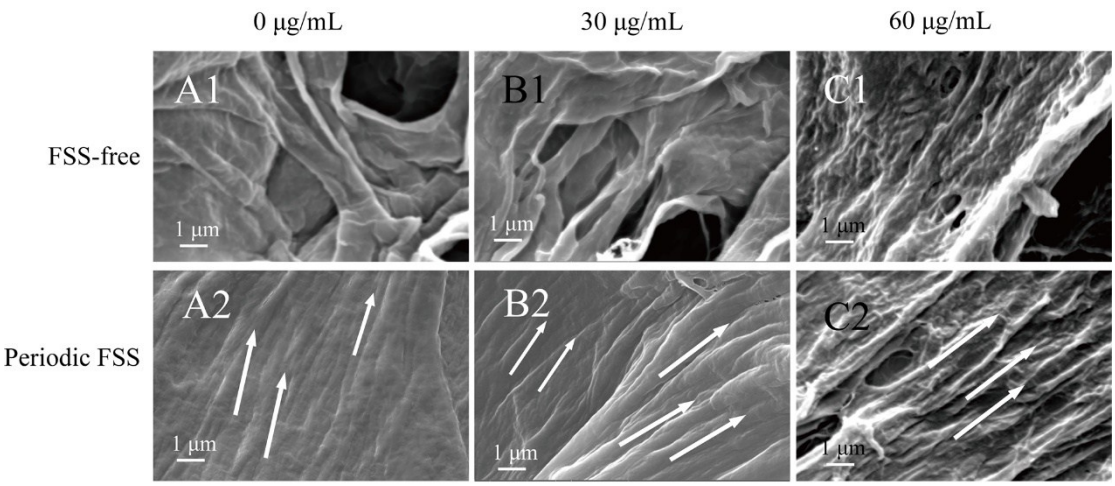

Fig. S3. SEM characterization to show the surface morphology of mineralized collagen after mineralizing for 12 h under the combined action of periodic FSS and different concentrations of PAA. With the appearance of periodic FSS, the mineralized collagen fibers are oriented in a certain direction (fine arrows) and the surface is much smoother than that of the corresponding FSS-free group.