Supplementary materials

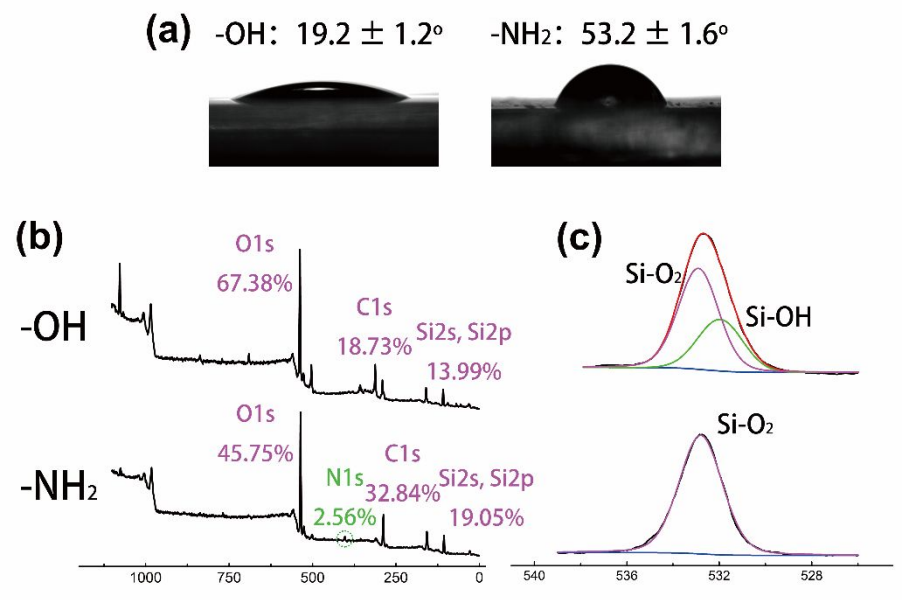
Adsorption Force of Fibronectin: A Balance Regulator to Transmission of Cell Traction Force and Fluid Shear Stress

*Jinfeng Wang[a], Junyao Li[a], Juan Liu[a], Manping Lin[b], Shilong Mao[a], Yuanliang Wang[a], Yanfeng Luo[a,]**

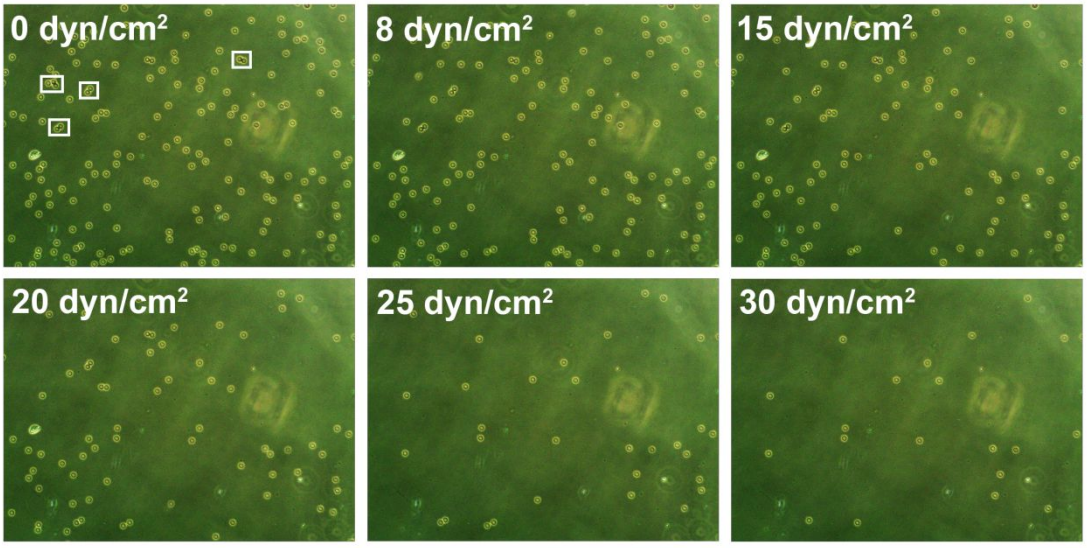
[a] Key Laboratory of Biorheological Science and Technology (Chongqing University), Ministry of Education, and Lab for Smart & Bioinspired Materials, College of Bioengineering, Chongqing University, Chongqing, 400030, China

[b] Key Laboratory of Emergency and Trauma, Ministry of Education, Hainan Medical University, Haikou, 571199, China

*Corresponding author. Y.F. Luo: College of Bioengineering, Chongqing University (Campus B), Chongqing 400030, China. Fax: +86 23 65102507.

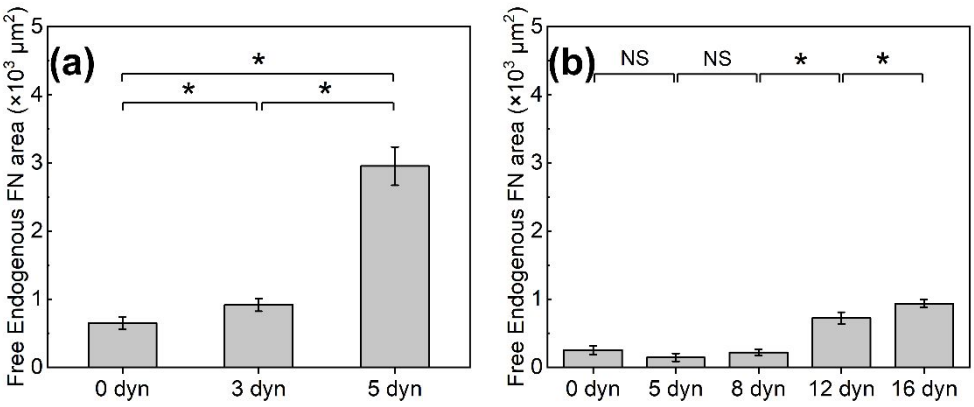


Supplementary Figure 1. Characterization of OH-SAM and NH_2-SAM on glass slides. **(a)** The static water contact angles; **(b)** for XPS spectra and **(c)** for high resolution O1s spectra. The existence of N1s in the XPS spectrum and disappearance of Si-OH in the high resolution O1s spectrum of NH_2-SAM verified the successful preparation of NH_2-SAM from OH-SAM.

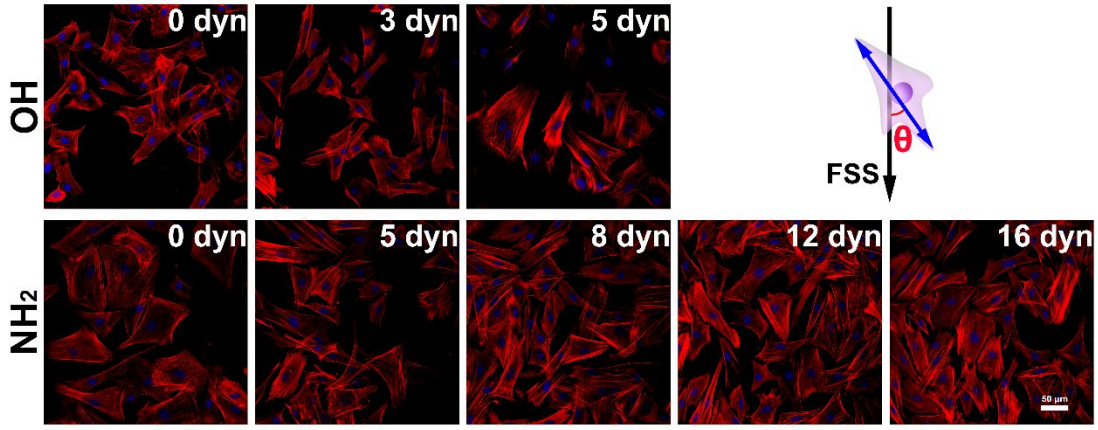


Supplementary Figure 2. Representative images of the detachment process of FN-conjugated microspheres versus a series of flow shear stress. The percentage of remained microspheres on the substrate were calculated which based on the number of remained microspheres and the

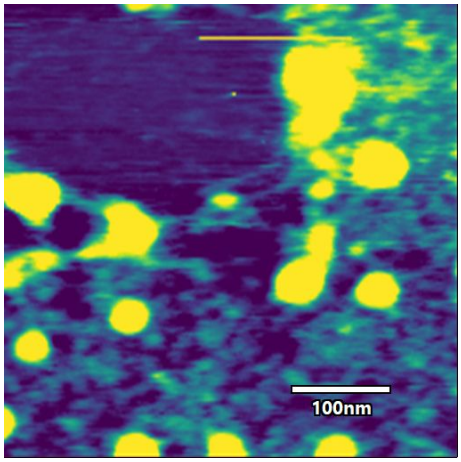
agglomerating microspheres (white rectangle) were excluded. The remained microspheres decreased with the increasing of flow shear stress.



Supplementary Figure 3. Quantitative analysis of free endogenous FN areas without cell spreading on different SAMs after osteoblasts were seeded in serum free medium for 4 h and exposure to various magnitudes FSS for 1 h (**(a)** for OH-SAMs and **(b)** for NH_2-SAMs).



Supplementary Figure 4. The orientation and F-actin formation of osteoblasts on different SAMs after osteoblasts were seeded in serum free medium for 4 h and exposure to various magnitudes FSS for 1 h (Scale bars indicate 50 μm. direction of flow: ↓). F-actin (red) and nuclei (blue).



Supplementary Figure 5. Representative atomic force microscopy (AFM) image for FN-conjugated surface. FN molecules were covalently grafted on the surface of flat NH_2-mica by using a procedure identical to that for grafting FN onto NH_2-spheres, by which the thickness of FN on flat mica can represent the thickness on the spheres. To test the thickness of the grafted FN, a small field of the grafted FN was wiped off by using the AFM probe and then the surface with and without FN field was scanned under AFM contact mode. The thickness of grafted FN was calculated by the height difference of fields with and without grafted FN.

Table 2. The angle (°) between cell long axis and FSS direction (n>100)

SAMs	0 dyn/cm²			3 dyn/cm²			5 dyn/cm²		
	0°-30°	30°-60°	60°-90°	0°-30°	30°-60°	60°-90°	0°-30°	30°-60°	60°-90°
OH	30.30	32.40	37.30	42.98	31.75	25.27	49.61	30.56	19.83
NH_2	32.15	35.46	32.39	——	——	——	36.06	33.45	30.49

Table 3. The angle (°) between cell long axis and FSS direction (n>100)

SAMs	8 dyn/cm²			12 dyn/cm²			16 dyn/cm²		
	0°-30°	30°-60°	60°-90°	0°-30°	30°-60°	60°-90°	0°-30°	30°-60°	60°-90°
OH	——	——	——	——	——	——	——	——	——
NH_2	44.36	33.54	22.10	58.85	26.45	14.70	61.79	27.17	11.04