# Supplementary Information

## The restricted adhesion of bone marrow mesenchymal stem cells by stepped structures on surfaces of hydroxyapatite

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AUTHOR INFORMATION

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## Results

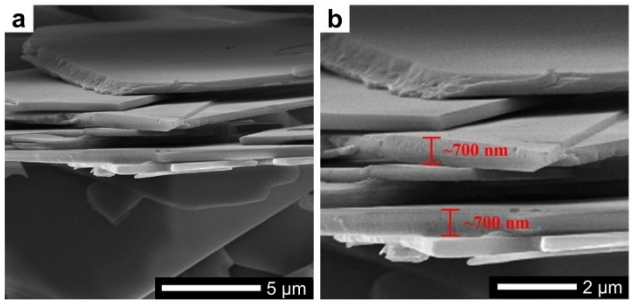


**Fig. S1** SEM images of $CaHPO_4$ particles in cross-section view. (a) Low magnification. (b) High magnification.

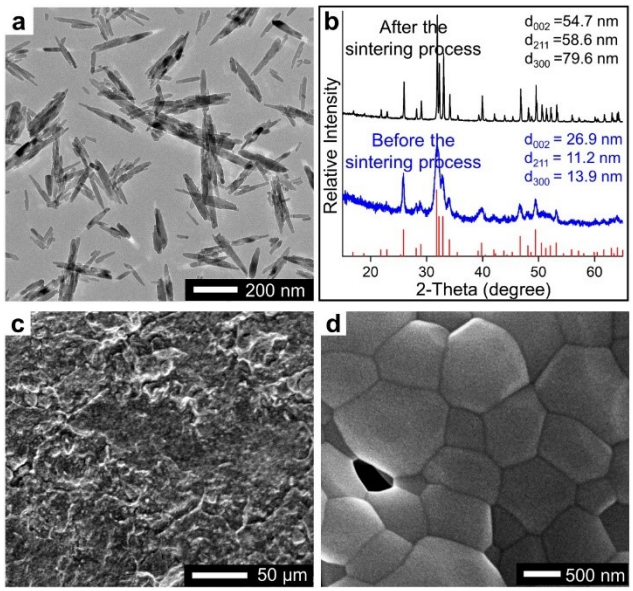


**Fig. S2** (a) TEM image of HA nanoparticles. (b) XRD patterns of the HA nanoparticles and the Nano-1 dishes. (c) and (d) SEM images of Nano-1 dishes.

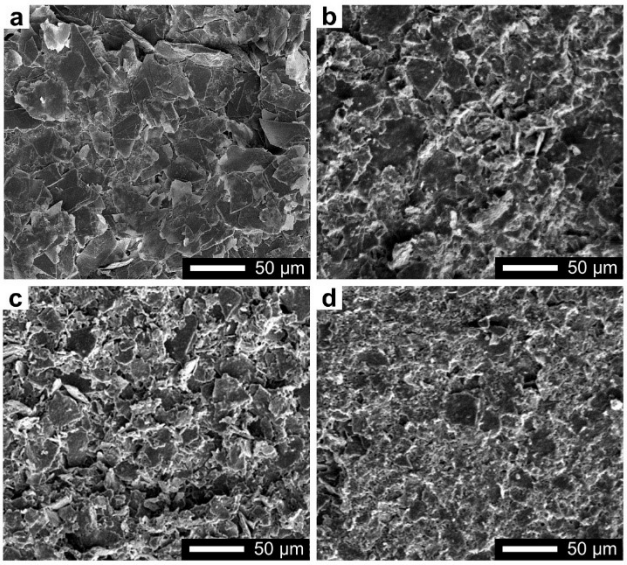


**Fig. S3** Low magnification SEM images of different HA dish samples: (a) Meso-1; (b) Meso-2; (c) Meso-3; (d) Meso-4.

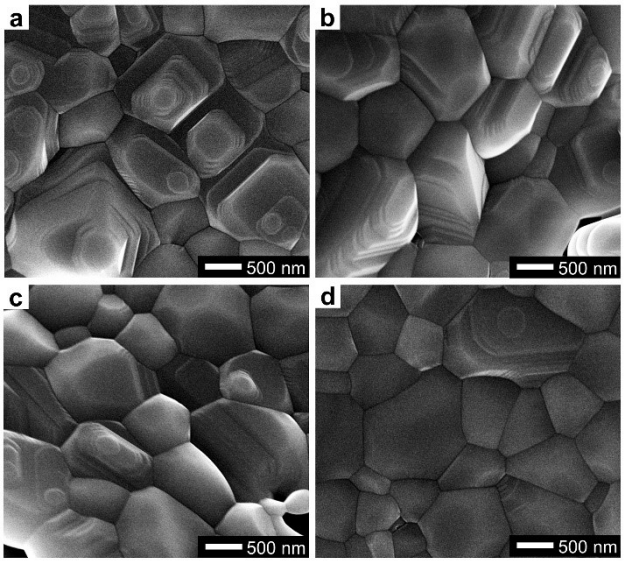


**Fig. S4** High magnification SEM images of different HA dish samples: (a) Meso-1; (b) Meso-2; (c) Meso-3; (d) Meso-4.

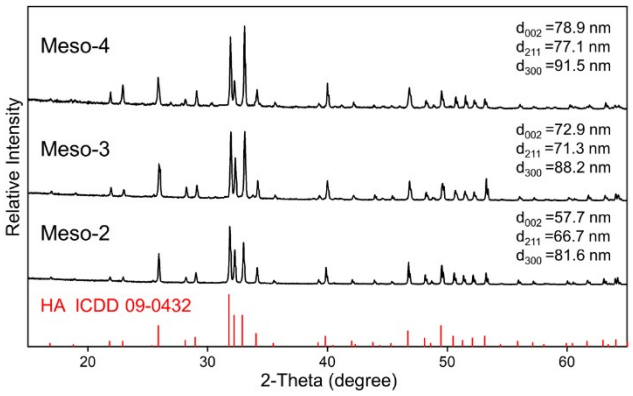


**Fig. S5** XRD patterns of different HA dish samples.

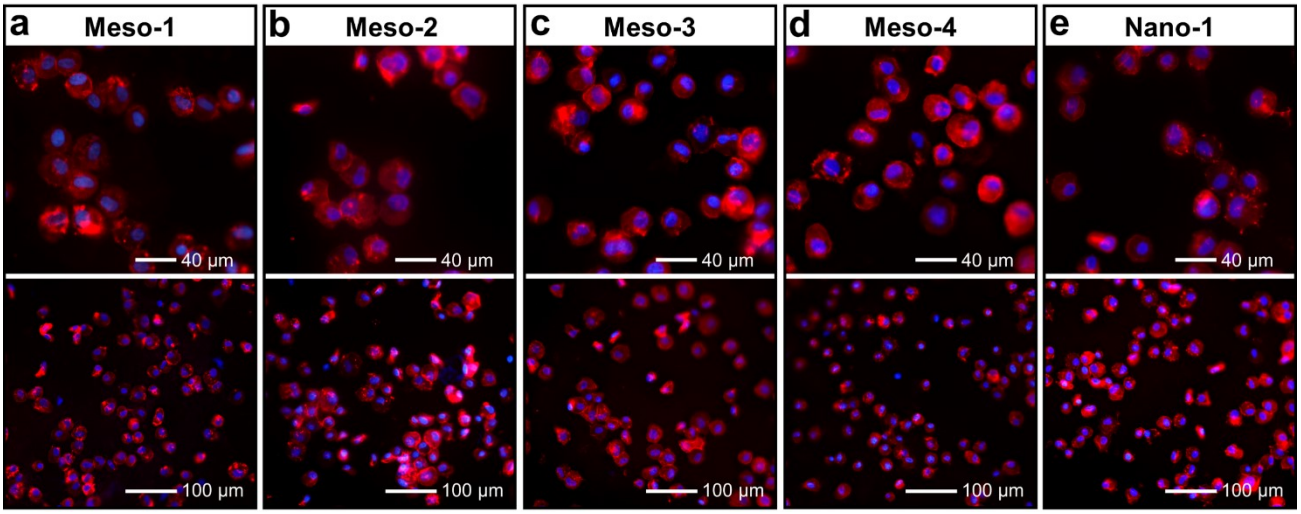


**Fig. S6** Fluorescence microscope images of BMSCs cultured on different HA dish samples for 1 h: (a) Meso-1, (b) Meso-2, (c) Meso-3, (d) Meso-4, (e) Nano-1; the nucleus was stained blue, and F-actin was stained red.

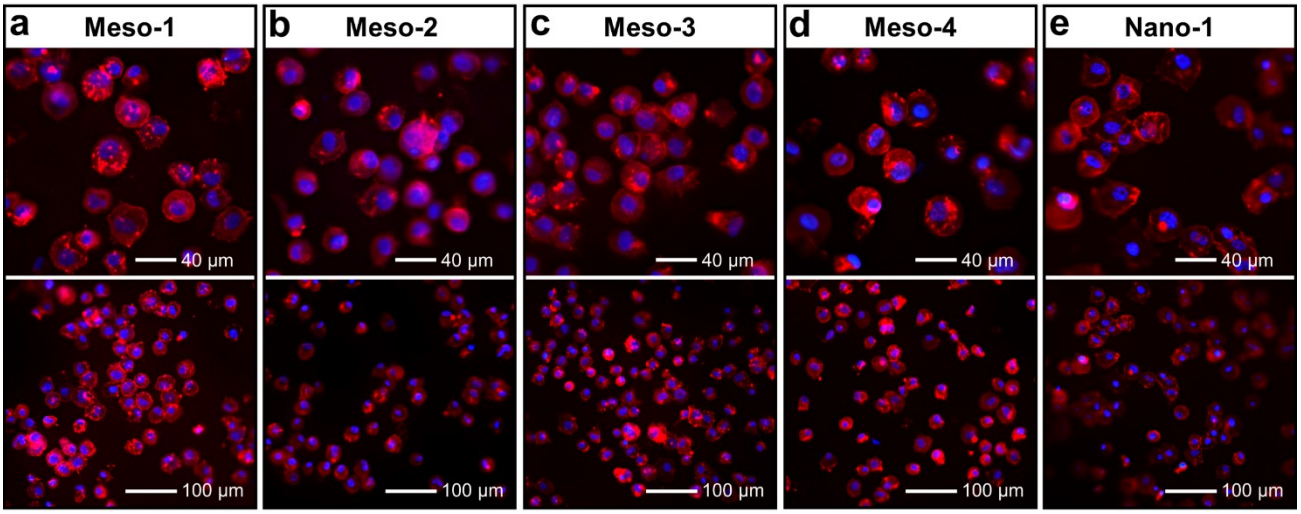


**Fig. S7** Fluorescence microscope images of BMSCs cultured on different HA dish samples for 3 h: (a) Meso-1, (b) Meso-2, (c) Meso-3, (d) Meso-4, (e) Nano-1; the nucleus was stained blue, and F-actin was stained red.

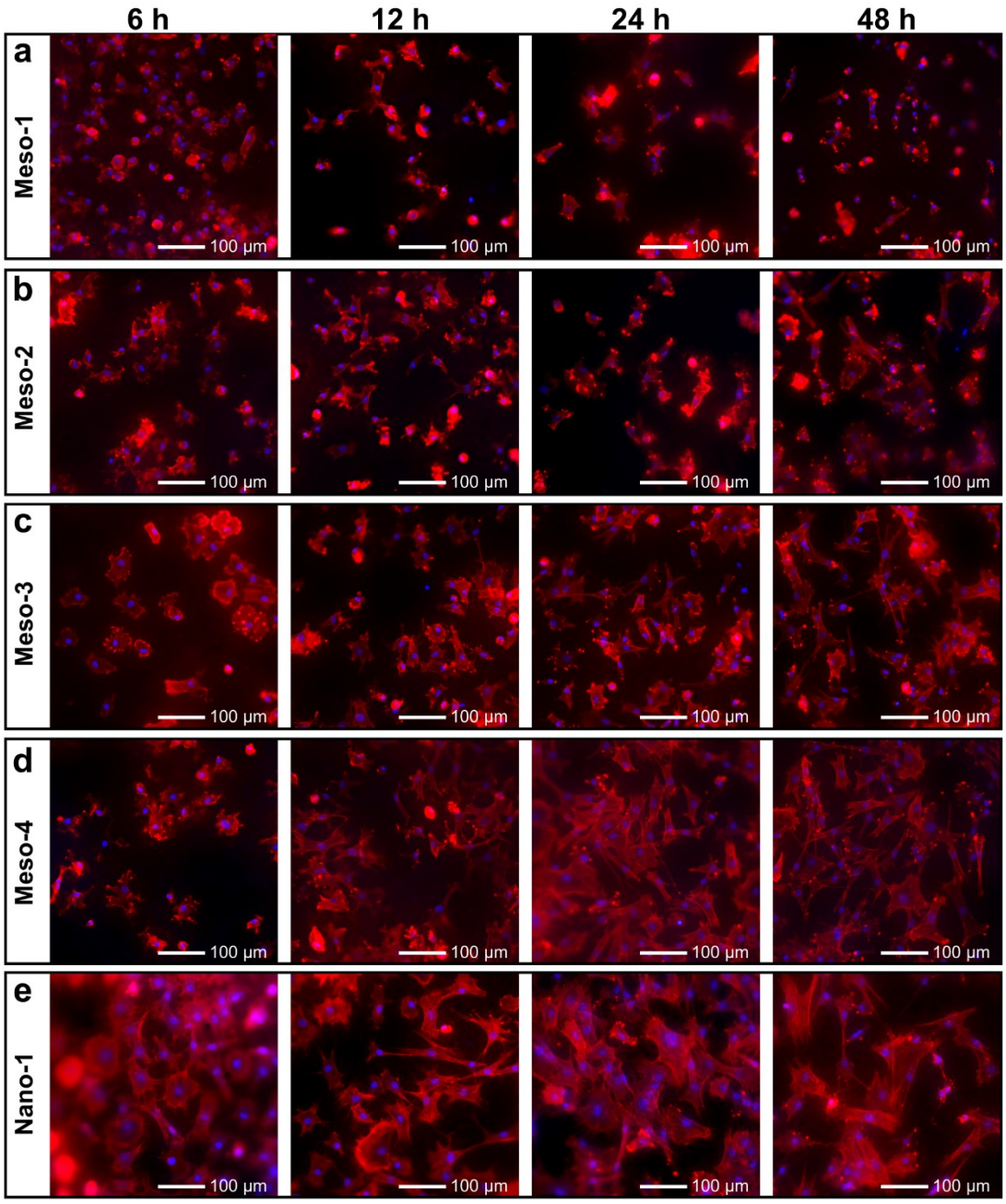


**Fig. S8** Low magnification fluorescence microscope images of BMSCs cultured on different HA dish samples for 6, 12, 24 and 48 h: (a) Meso-1, (b) Meso-2, (c) Meso-3, (d) Meso-4, (e) Nano-1; the nucleus was stained blue, and F-actin was stained red.

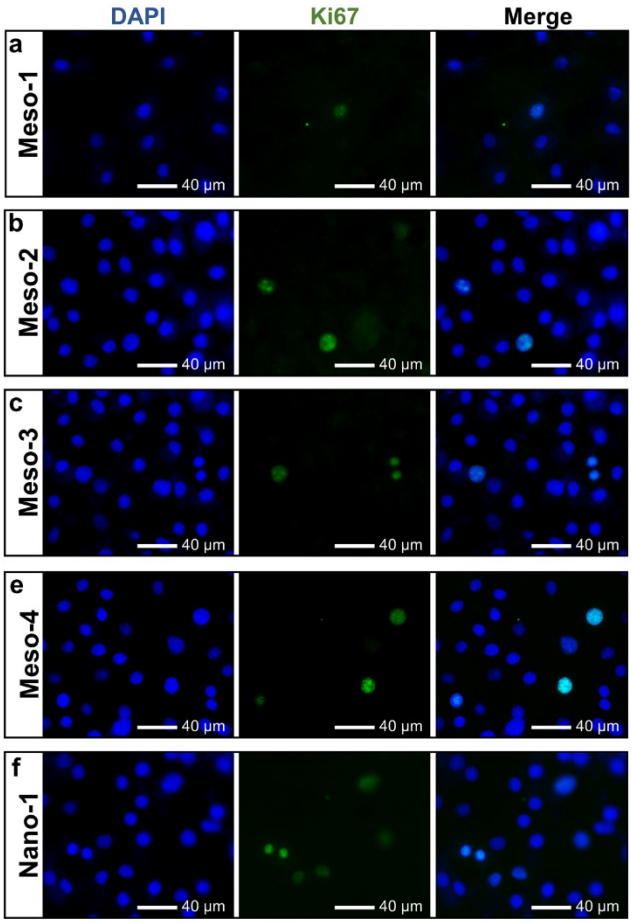


**Fig. S9** Fluorescence microscope images of BMSCs cultured on different HA dish samples for 24 h: (a) Meso-1, (b) Meso-2, (c) Meso-3, (d) Meso-4, (e) Nano-1; the nucleus was stained blue, and Ki76 was stained green.

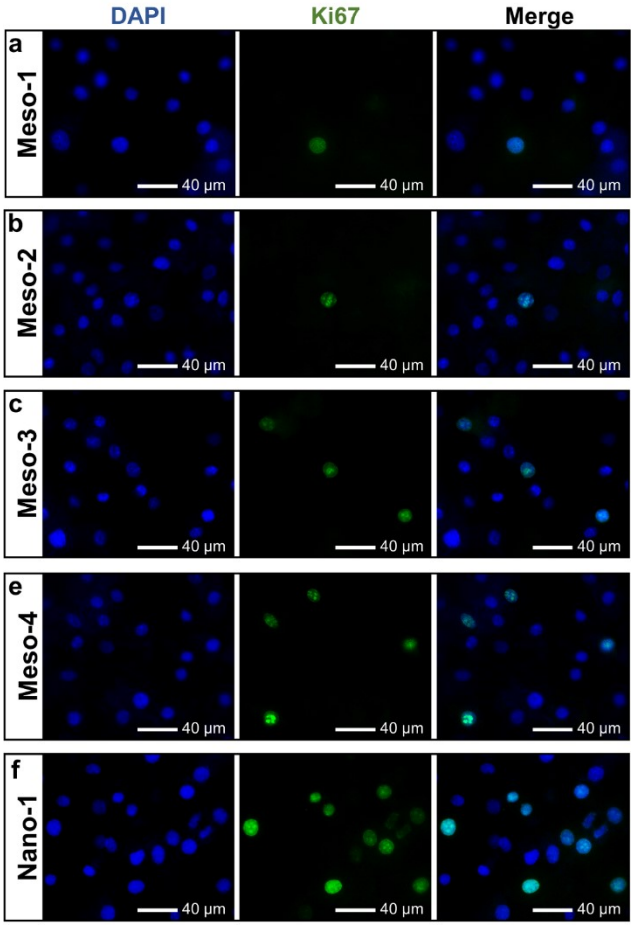


**Fig. S10** Fluorescence microscope images of BMSCs cultured on different HA dish samples for 48 h: (a) Meso-1, (b) Meso-2, (c) Meso-3, (d) Meso-4, (e) Nano-1; the nucleus was stained blue, and Ki76 was stained green.

| Samples | 1 day | 2 days | 4 days |
|---|---|---|---|
| Meso-1 | < 0.01 mM | < 0.01 mM | < 0.01 mM |
| Meso-2 | < 0.01 mM | < 0.01 mM | < 0.01 mM |
| Meso-3 | < 0.01 mM | < 0.01 mM | < 0.01 mM |
| Meso-4 | < 0.01 mM | < 0.01 mM | < 0.01 mM |
| Meso-5 | < 0.01 mM | < 0.01 mM | < 0.01 mM |

**Table S1** Concentrations of $Ca^{2+}$ ions in PBS solution samples obtained by incubating different HA dish samples in 1 ml PBS solution (originally without $Ca^{2+}$ ions) at 37 °C for different times (1~4 days).

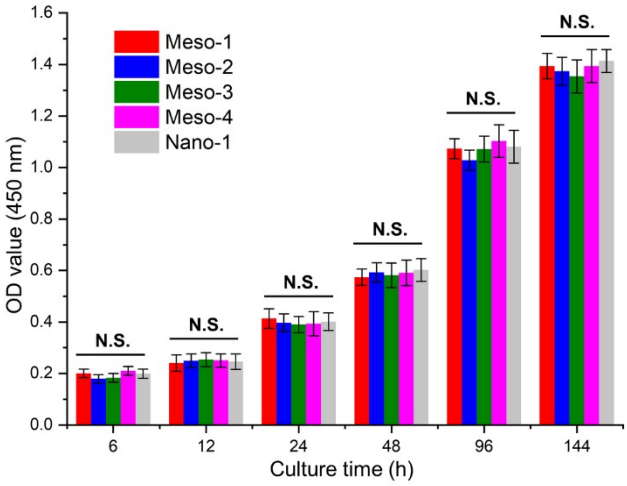


**Fig. S11** CCK-8 assay for the proliferation of BMSCs treated by the extracts from different HA dish samples. Values were presented as mean ± s.d., n = 5 biologically independent measurements, N.S. represents no significant difference, compared with Nano-1 group.

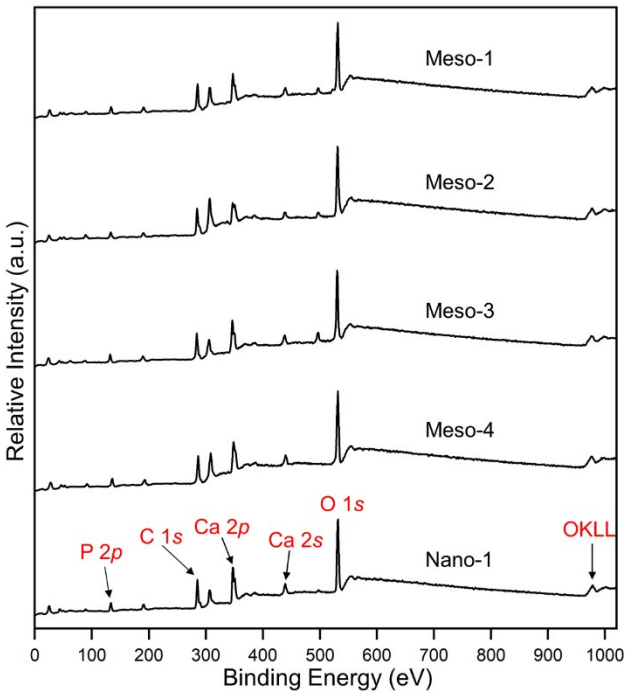


**Fig. S12** XPS full spectra of different HA dish samples.