

## Supplementary material

**Table 1.** Three different aqueous system for hydrothermally treating to generate nanostructures on HA bioceramics.

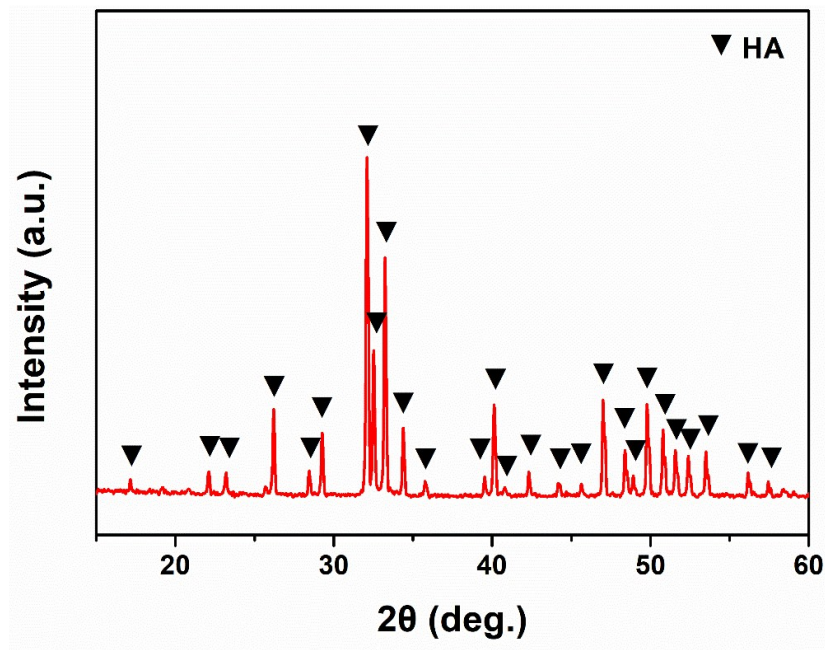
Nanostructures	nanoneedle	nanosheet	nanorod
	Simpfiled SBF with 0.02 M aspartic acid, pH of the solutions was adjusted 7.4	Simpfiled SBF with 0.02 M aspartic acid without pH adjustion	Simpfiled SBF

**Simpfiled SBF:** 140 mM NaCl, 2.5 mM CaCl<sub>2</sub> and 1 mM K<sub>2</sub>HPO<sub>4</sub>, pH of the solutions was adjusted to a specific value at 7.4

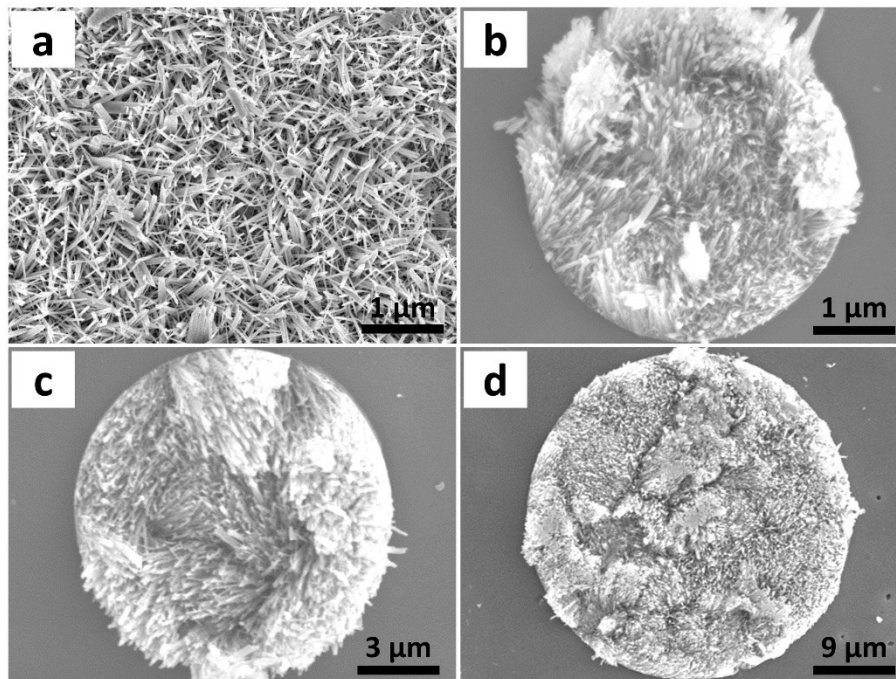
**Table 2.** The primer sequence of all genes used in the Real-time PCR.

Gene	Direction	Primer sequence
GAPDH (mouse)	Forward	TGACCACAGTCCATGCCATC
	Reverse	GACGGACACATTGGGGGTAG
CCR7	Forward	TGTACGAGTCGGTGTGCTTC
	Reverse	GGTAGGTATCCGTCATGGTCTTG
iNOS	Forward	CACCAAGCTGAACTTGAGCG
	Reverse	CGTGGCTTTGGGCTCCTC
TNF- $\alpha$	Forward	CCTCCCTCTCATCAGTTCTA
	Reverse	ACTTGGTGGTTTGCTACGAC
ARG-1	Forward	CCAGAAGAATGGAAGAGTCAGTGT
	Reverse	GCAGATATGCAGGGAGTCACC
CD206	Forward	CTCTGTTCAGCTATTGGACGC
	Reverse	CGGAATTTCTGGGATTCAGCTTC
IL-10	Forward	GAGAAGCATGGCCAGAAATC
	Reverse	GAGAAATCGATGACAGCGCC
GAPDH (human)	Forward	GATTTGGTCGTATTGGGCG
	Reverse	CTGGAAGATGGTGATGG
BMP2	Forward	TTCGGCCTGAAACAGAGACC
	Reverse	CCTGAGTGCCTGCGATACAG
COL1	Forward	GCAATGACGAGACTGGCAACC
	Reverse	TCAGCACCACCGATGTCCAAA
RUNX2	Forward	TGGTTACTGTCATGGCGGGTA
	Reverse	TCTCAGATCGTTGAACCTTGCTA
eNOS	Forward	TGTCCAACATGCTGCTGGAAATTG
	Reverse	AGGAGGTCTTCTTCCTGGTGATGCC
VEGF	Forward	TAT GCG GAT CAA ACC TCA CCA
	Reverse	CAC AGG GAT TTT TCT TGT CTT GCT

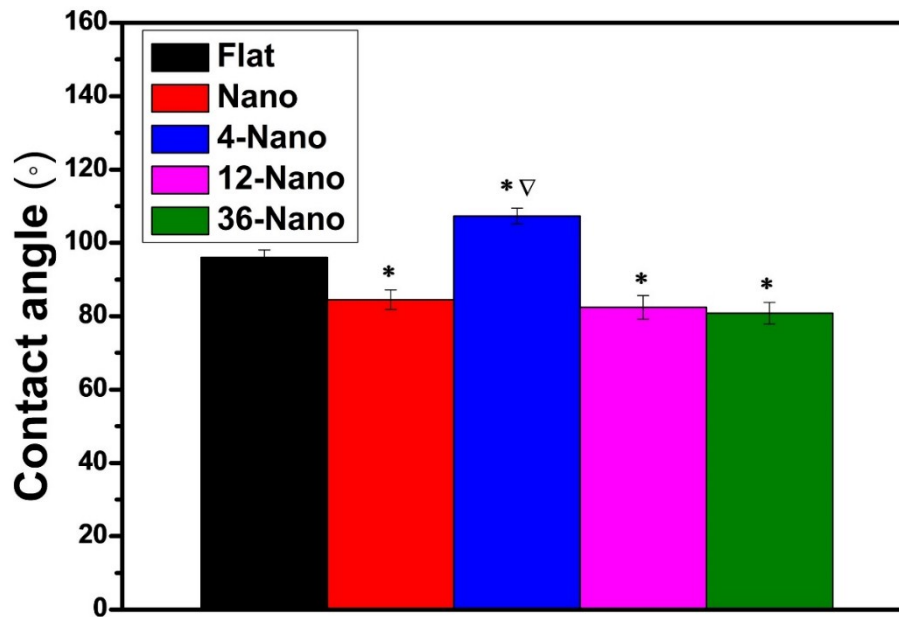
Gene	Direction	Primer sequence
BFGF	Forward	CAATTCCCATGTGCTGTGAC
	Reverse	ACCTTGACCTCTCAGCCTCA



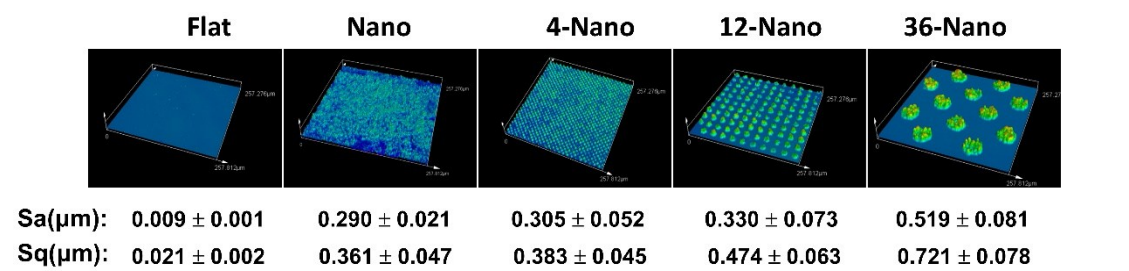
**Figure S1.** XRD patterns of the nanoneedle structures.



**Figure S2.** High magnification images of nanoneedle structures in Nano-group (a), 4-Nano group (b), 12-Nano group (c) and 36-Nano group (d).



**Figure S3.** Contact angle of HA bioceramics with different topographical surfaces. \*: Significant difference ( $P < 0.05$ ) compared to the Flat group. ∇: Significant difference ( $P < 0.05$ ) compared to the Nano group.



**Figure S4.** 3D images and the surface roughness of HA bioceramics with different topographical surfaces.