Carbazate modified sephadex microparticles suppress the

progression of osteoarthritis by ROS scavenging

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Fig. s1. Image of microparticles (S, $SC_{(L)}$ and $SC_{(H)}$) after TNBS assay.



Fig. s2. Surface contact angle of S, $SC_{(L)}$ and $SC_{(H)}$.

Produc	Sephadex (g)	DMSO (mL)	CD	Hydrazine	DS %	
t			Ι	(80%, TNDS		Elemental
			(g)	mL)	INDS	analysis
SC _(L)	1	30	1	4	4.1	4.5
SC _(H)	1	30	8	8	9.4	10.3

Table S1. The reaction condition and DS of modified microparticles.



Fig. s3. pH stability of microparticles: S, $SC_{(L)}$ and $SC_{(H)}$. A) The absorbance of carbazate groups from $SC_{(H)}$ versus time under different pH solutions (pH= 1.0, 2.5, 4.0 and 7.4) by TNBS. B) The absorbance of carbazate groups from S, $SC_{(L)}$ and $SC_{(H)}$ versus time under pH= 1.0 buffer solution by TNBS. The absorbance was obtained at 344 nm by UV- vis spectroscopy.



Fig. s4. Clearance effects on •OH by microparticles: S, SC_(L) and SC_(H) (50 mg). A)
Direct image of •OH clearing testing after incubating with microparticles for 60 min.
B) UV- vis spectroscopy intensity of the corresponding sample solutions versus time.

Samples were: testing buffer (blank), testing buffer+ S (S), testing buffer+ $SC_{(L)}$ ($SC_{(L)}$), testing buffer+ $SC_{(H)}(SC_{(H)})$, and control buffer (control).



Fig. s5. Clearance effects on $\bullet O_2^-$ by microparticles: S, SC_(L) and SC_(H) (50 mg). A)

Direct image of $\bullet O_2^-$ clearing testing after incubating with microparticles. B) UV- vis spectroscopy intensity of the corresponding samples solutions versus time. Samples were: testing buffer (blank), control buffer (control), testing buffer+ S (S), testing buffer+ SC_(L) (SC_(L)), and testing buffer+ SC_(H) (SC_(H)).



Fig. s6. Clearance effects on H_2O_2 by microparticles: S, $SC_{(L)}$ and $SC_{(H)}$ (50 mg). A) Direct image of H_2O_2 clearing testing after incubating with microparticles. B) UV- vis spectroscopy intensity of the corresponding samples solutions versus time. Samples were: testing buffer (H_2O_2), testing buffer+ S (S), testing buffer+ $SC_{(L)}$ ($SC_{(L)}$), testing buffer+ $SC_{(H)}$ ($SC_{(H)}$) and control buffer (control).



Fig. s7. The absorbance of ROS clearance effects of microparticles: S, $SC_{(L)}$ and $SC_{(H)}$ (50 mg) versus time. The absorbance was selected at 536 nm, 530 nm and 411 nm respectively for •OH (A), •O₂⁻ (B), and H₂O₂ (C) by UV- vis spectroscopy.



Fig. s8. The statistic ROS clearance ratios of different amounts (10, 20 and 50 mg) of microparticles: S, $SC_{(L)}$ and $SC_{(H)}$ at different time points.



Fig. s9. The reaction mechanism of SC and cBSA.

Gene name	Forward primer	Reverse primer		
GAPDH	5'-TCCAGTATGACTCTACCCAGC-3'	5'-CACGACATACTCAGCACCAG-3'		
Acan	5'-GAATGGGAGCCAGCCTACAC-3'	5'-GAGAGGCAGAGGGACTTTCG-3'		
MMP-13	5'-GGACAAAGACTATCCCCGCC-3'	5'-GGCATGACTCTCACAATGCG-3'		
IL-6	5'-TCTGGTCTTCTGGAGTTCCG-3'	5'-AGCATTGGAAGTTGGGGTAGG-3'		
GSH-Px	5'-TCTGAGGGGGATTTTTCTGGA-3'	5'-TGGTATCTGGGGCTTGGTGAT-3'		
CAT	5'-AGAGGAAACGCCTGTGTGAG-3'	5'-TAGTCAGGGTGGACGTCAGT-3'		
SOD1	5'-ATTCACTTCGAGCAGAAGGCA-3'	5'-ATTGCCCAGGTCTCCAACAT-3'		

Table S2. Detailed gene primer sequences for qRT- PCR.



Fig. s10. DNA gel electrophoresis of gene expression (GSH-Px, ACAN, IL-6 and MMP-13) samples from qRT- PCR for H_2O_2 treated chondrocytes after $SC_{(H)}$ incubation.



Fig. s11. Standard curve of inflammatory factors (IL-6 and MMP-13) by UV- vis spectroscopy.



Fig. s12. The biological effects of microparticles on macrophages. A) The viability of macrophages after incubating with mciroparticles: S, $SC_{(L)}$ and $SC_{(H)}$ with concentrations ranging from 0 to 100 mg/ mL by MTT assay. B) The morphology of macrophages after incubating with mciroparticles: S, $SC_{(L)}$ and $SC_{(H)}$ (20 mg/ mL). C) Flow cytometry characterization of intracellular ROS levels of LPS (5 µg/ mL, 10 min) treated macrophages followed by incubating with microparticles (20 mg/ mL) for 24 h.

D 1 (Ē	Elemental and	alysis (wt %)
Product	Н	С	Ν	0
S	2.91	43.68	0.05	53.36
SC(L)	2.28	41.70	2.10	53.92
SC _(H)	1.65	41.52	4.77	52.06

SC _(H)	1.65	41.52	4.77	52.06	
Table S3. I	Detailed da	ata of elem	ental anal	ysis for mic	roparticles.