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Supporting Information

A smart injectable composite hydrogel with magnetic navigation and controlled glutathione release for promoting in-situ chondrocyte array and self-healing in damaged cartilage tissue

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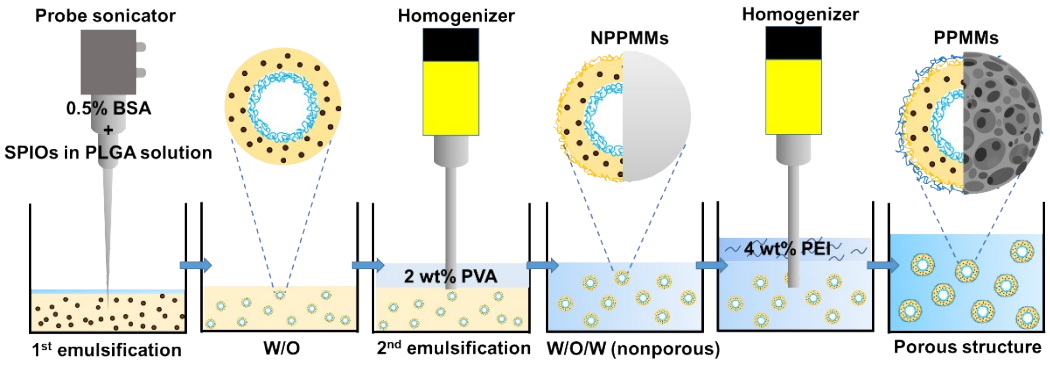

Fig. S1. Scheme for the formation of NPPMMs or PPMMs by double emulsification.

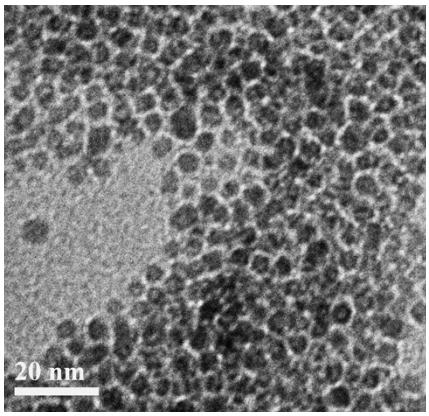

Fig. S2. The particle size and morphology of superparamagnetic iron oxide nanoparticles (SPIO) under TEM analysis.

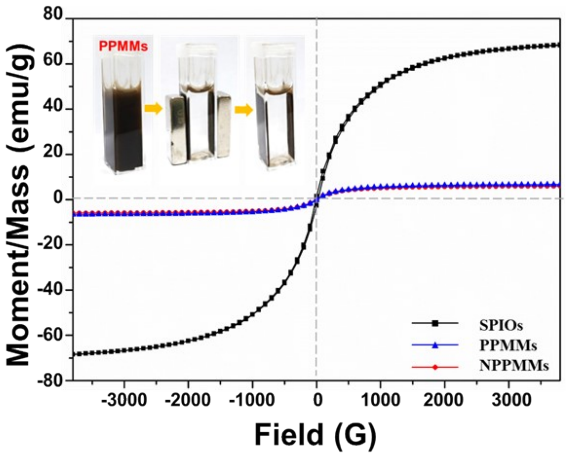

Fig. S3. Field-dependent magnetization curve of SPIOs, PPMMs, and NPPMMs. The inset shows that the PPMMs are attracted by an external magnet.

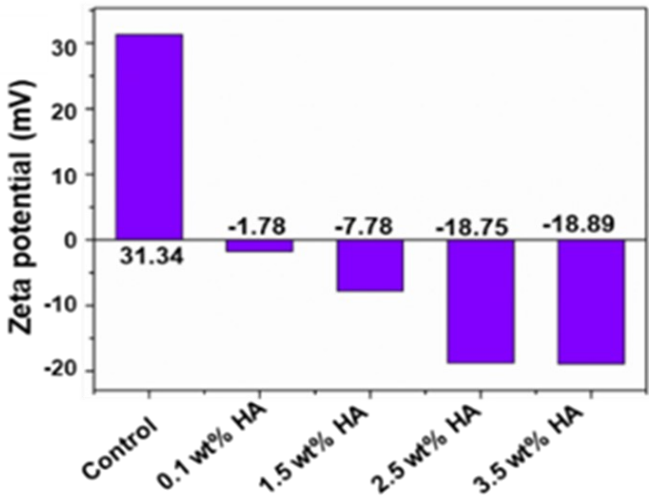

Fig. S4. Zeta potential of PPMMs microspheres was changed with increasing HA concentration

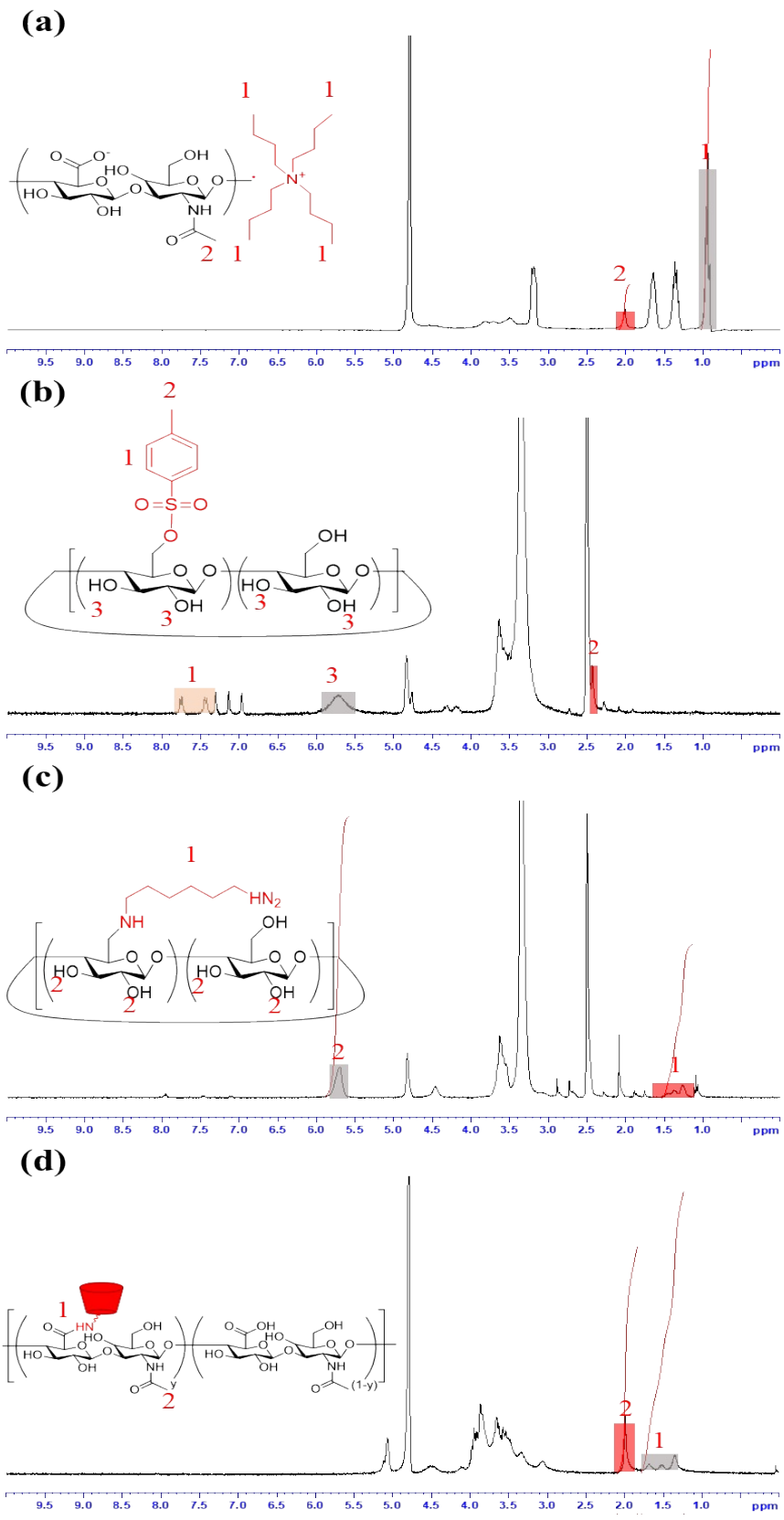

Fig. S5. ^{1}H NMR spectrum of (a) HA-TBA, (b) CD-Tos, (c) CD-HAD, (d) HA-CD.

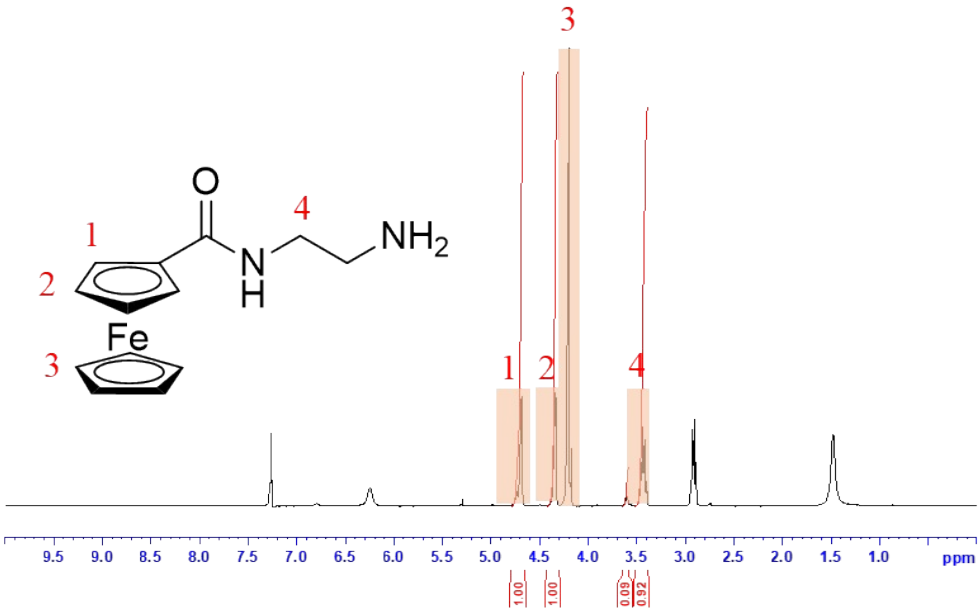

Fig. S6. ^{1}H NMR spectrum of Fe-CONH-$(CH_2)_2$-NH_2

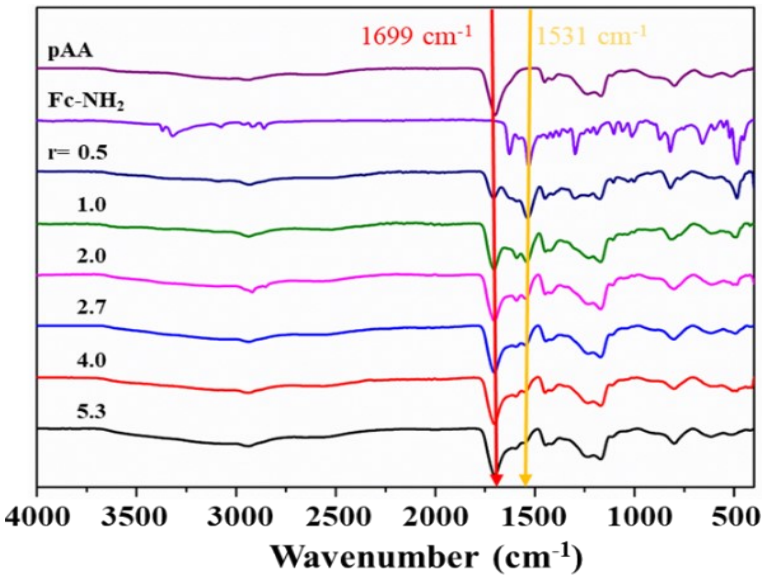

Fig. S7. ATR-FTIR transmittance spectra of pAA-Fc with various ratios of pAA/Fc.

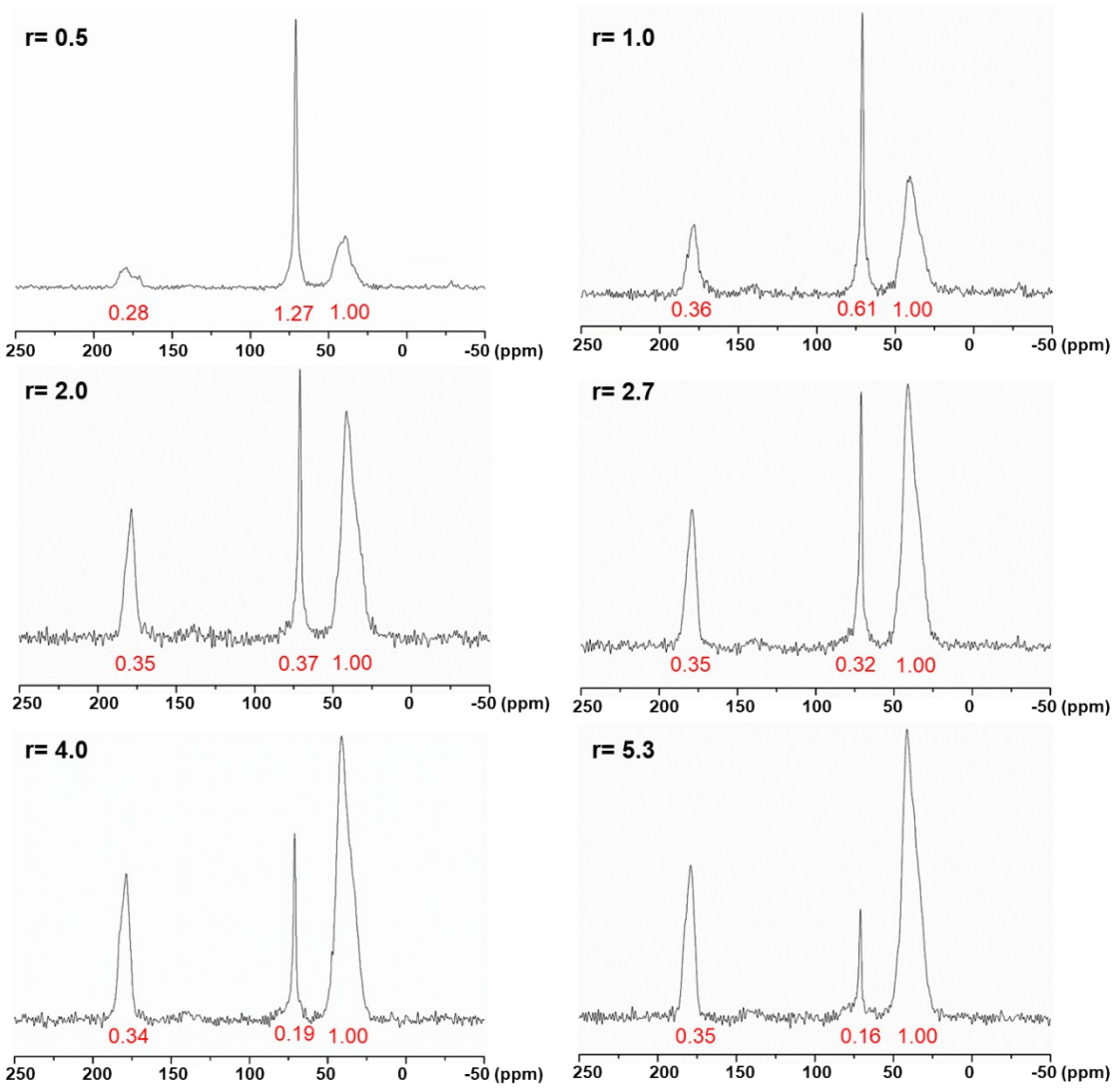

Fig. S8. ^{13}C NMR spectrum of pAA-Fc with various ratios of pAA/Fc

Fig. S9. Fluidity viscosity of pAA-Fc with various ratios of pAA/Fc

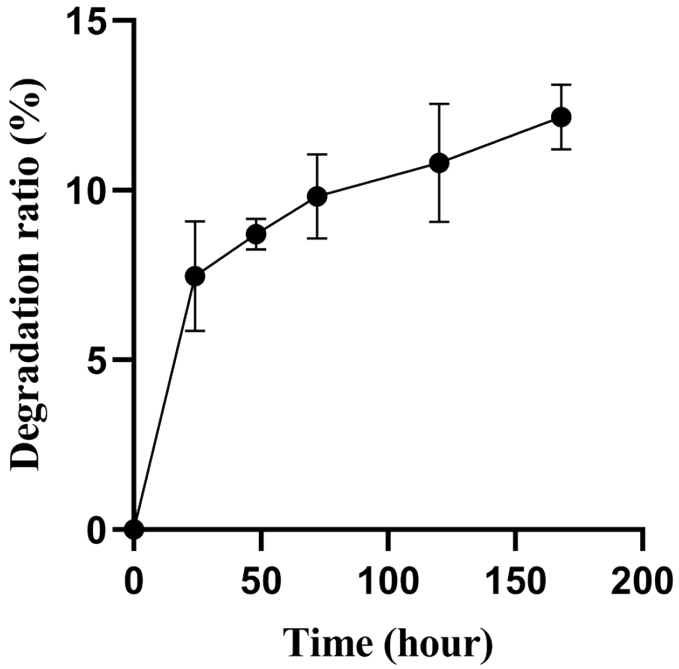

Fig. S10. Degradation behavior of the HA-PAA hydrogel over 7 days

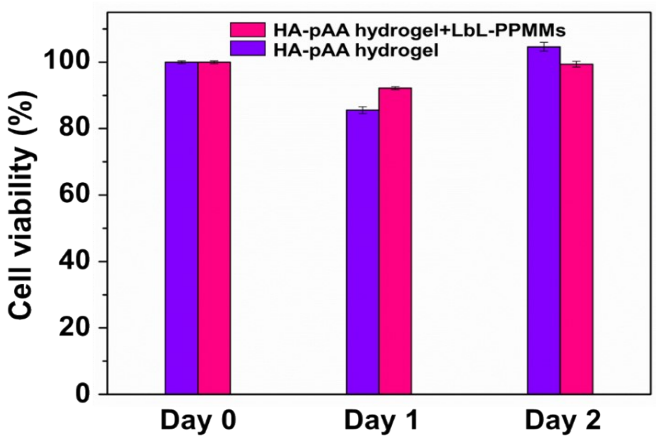

Fig. S11. Relative cell viability of chondrocytes embedded in HA-pAA hydrogel with/without added LbL-PPMMs.

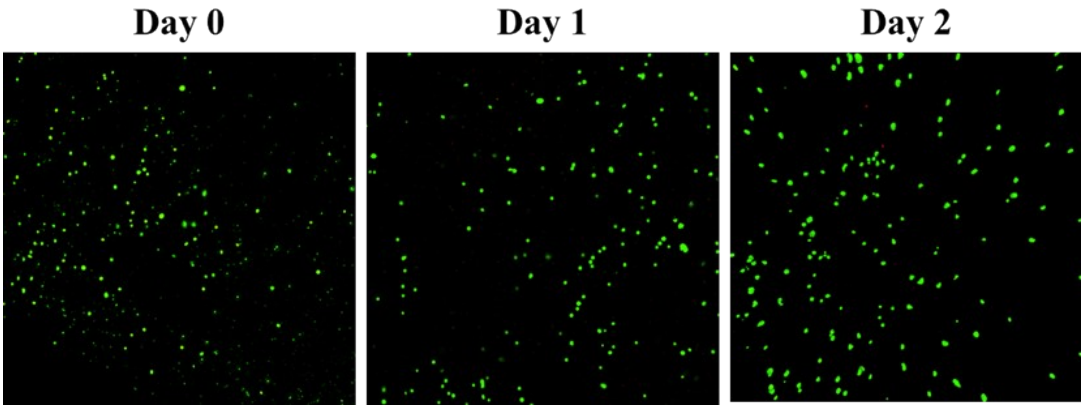

Fig. S12. Cell viability of chondrocytes embedded in HA-pAA hydrogel (Green: live cells; Red: dead cells) (scale bar = 300 μm).

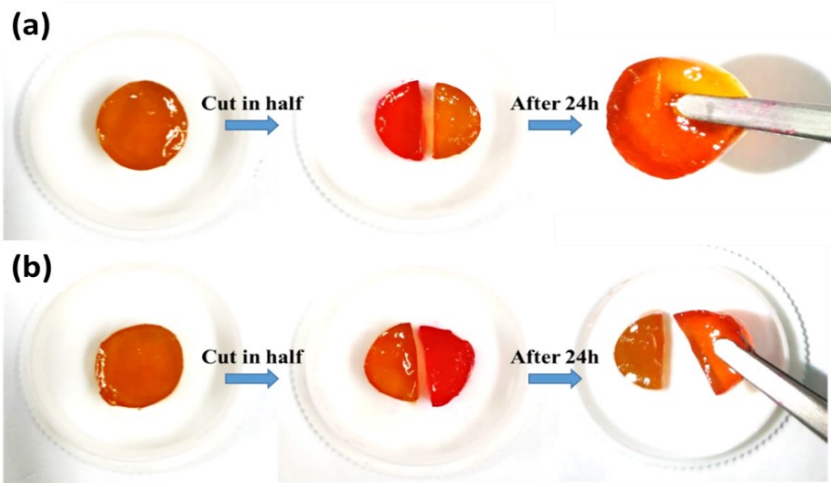

Fig. S13. Redox-responsive healing ability of the HA-pAA hydrogel triggered by (a) GSH and (b) NaClO.

Fig. S14. A schematic to illustrate the self-healing mechanism in hyaluronic acid-cyclodextrin (HA-CD) and polyacrylic acid-ferrocene (pAA-Fc).

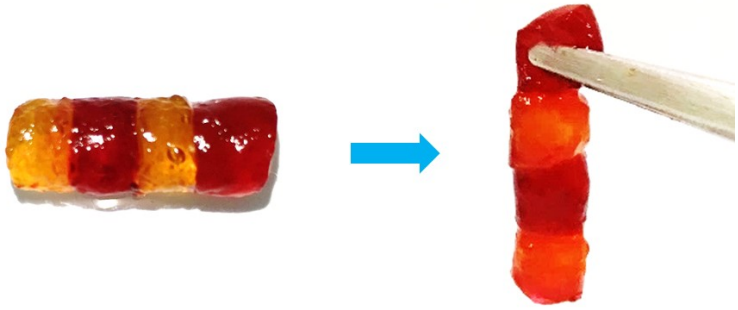

Fig S15. Self-healing ability of the HA-pAA hydrogel with GSH-loaded LbL-PPMMs after 4 h.

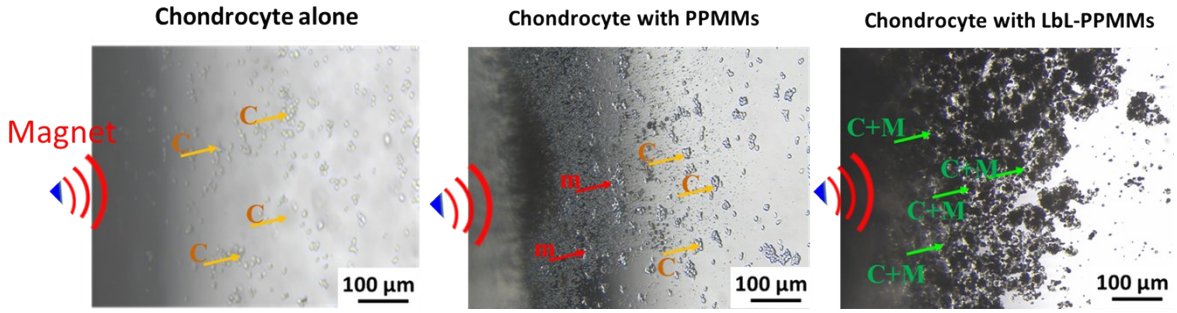

Fig. S16. **C**: Chondrocytes, **m**: PPMMs (free-HA coated microparticles), **C+M**: Chondrocytes engrafted with magnetic LbL-PPMMs (HA-coated microparticles)

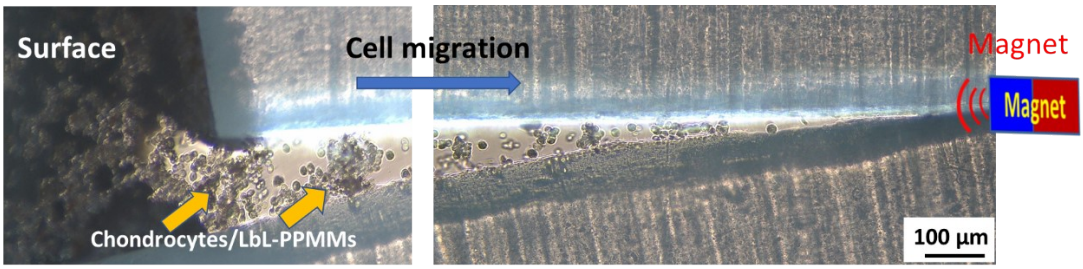

Fig. S17. An in-vitro experiment to simulate cell migration by an external magnetic force to observe the dynamic cell movement.