MSC-Exosome-Curcumin Loaded Bioadhesive Auxetic Hydrogel Patches for Chronic Wound Healing
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In this project, we aim to develop a series of therapeutic-delivering skin-mimicking auxetic hydrogel patches that are highly bioadhesive for the treatment of chronic wounds. The therapeutic agents incorporated in the hydrogel system are curcumin and mesenchymal stem cell-derived exosomes (MSC-Exosomes). Curcumin is infused in hydrogel ink for both antioxidative effects that reduce inflammation at chronic wound sites and UV-absorptive effects that assist in UV-crosslinking of the patches. Mesenchymal stem cell-derived exosomes are coated on the patches to promote epithelial cells proliferation and migration. The patches are synthesized with digital light projecting 3D-bioprinting. The resultant patches are compatible with the anisotropic foot skin deformation and demonstrate high bioadhesiveness. In vitro cell studies support the biocompatibility of the hydrogel patches and the wound healing effects with the presence of MSC-Exosomes.