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Effects of Auxetic Antibacterial Zwitterion Carboxylate and Sulfate Copolymer Hydrogels for Diabetic Wound Healing Application

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Abstract : Zwitterionic polymers generally have been viewed as a new class of antimicrobial and non-fouling materials. They offer a broad versatility for chemical modification and hence great freedom for accurate molecular design, which bear an equimolar number of homogenously distributed anionic and cationic groups along their polymer chains. This study explores the effectiveness of the auxetic zwitterion carboxylate/sulfonate hydrogel in the diabetic-induced mouse model. A series of silver metal-doped auxetic zwitterion carboxylate/sulfonate/vinylaniline copolymer hydrogels is designed via a 3D printer. Zwitterion monomers have been characterized by FT-IR and NMR techniques. The effect of changing the monomers and different loading ratios of Ag over zwitterion on the final hydrogel materials' antimicrobial properties and biocompatibility will be investigated in detail. The synthesized auxetic hydrogel has been characterized using a wide range of techniques to help establish the relationship between molecular level and macroscopic properties of these materials, including mechanical and antibacterial and biocompatibility and wound healing ability. This work's comparative studies and results provide new insights and guide us in choosing a better auxetic structured material for a broad spectrum of wound healing applications in the animal model. We expect this approach to provide a versatile and robust platform for biomaterial design that could lead to promising treatments for wound healing applications.

Keywords : auxetic, zwitterion, carboxylate, sulfonate, polymer, wound healing
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