Photocrosslinkable Keratin-based Hydrogel for Cell Encapsulation

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Technology description

Background:
Hydrogels are used extensively as matrices for delivery and immobilization of stem cells to the site of defect in soft tissue regeneration. They resemble the extracellular matrix (ECM) of soft tissues due to their crosslinked network of macromolecular chains which absorb large amounts of water without dissolving. Collagen and denatured gelatin (and their composites) are widely used as injectable gels for cell encapsulation and delivery in tissue regeneration. However, collagen-based hydrogels suffer from batch-to-batch variability in composition, limited thermal and mechanical stability, and relatively fast and uncontrollable enzymatic degradation in vivo. There is therefore a need to develop alternative natural protein-based hydrogels that mimic the natural ECM, but have more predictable amino acid composition attributes and greater control over degradation.
Invention Description:
The subject invention is a method for the preparation of modified and functionalized keratin, denoted by KeratATE, from poultry feather. The modified functionalized keratin can be chemically crosslinked by ultraviolet light.

Application area

1. The hydrogels produced could be used for drug delivery or as injectable matrix for cell encapsulation in tissue engineering and regenerative medicine.
2. The hydrogel could also be used as a soft biomaterial for soft tissue repair in biomedical applications.

Advantages

1. The modified keratin is cheaper than collagen
2. It is easier to dissolve in aqueous solution than collagen or gelatin
3. Exhibits less batch-to-batch variation

Institution

University of South Carolina

Inventors

Esmaiel Jabbari
Professor
Chemical Engineering