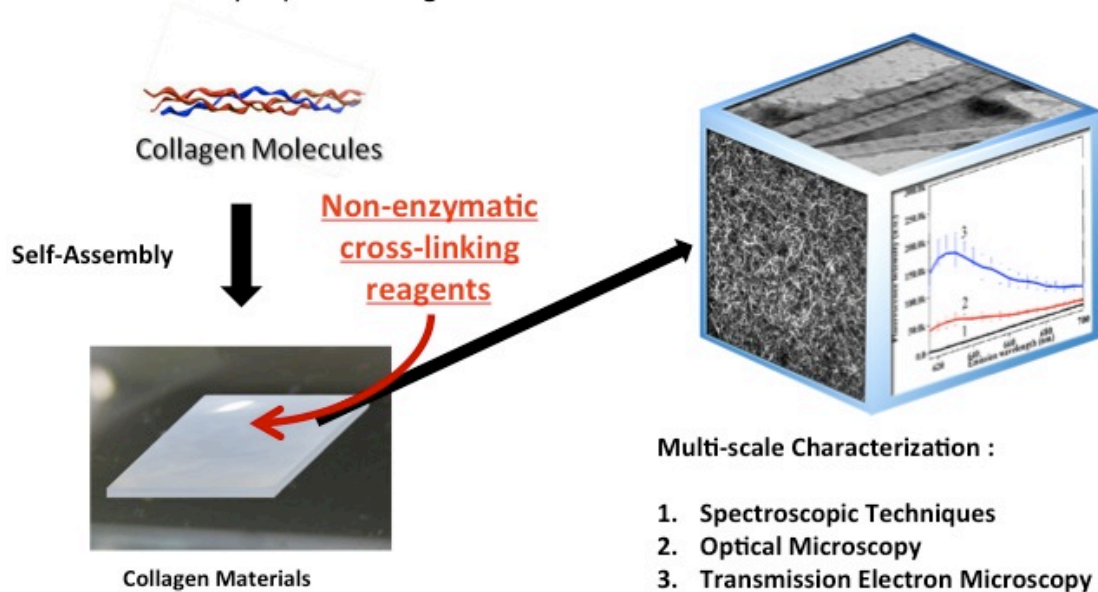


Non-enzymatic cross-linking of collagen materials

A process where the reaction between the collagen molecule and the cross linking reagent will make a stiffer and stronger resulting material. We are currently experimenting with both zero and nonzero cross-linkers.



Non-enzymatic Cross-linking Reagent Genipin

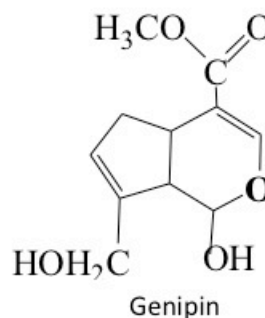
- It is the active compound found in the Gardenia fruit extract, which is used in traditional Chinese medicine to relieve the symptoms of type 2 diabetes
- It has low acute toxicity
- It's an excellent cross-linking reagents for proteins



Gardenia jasminoides
– intense fragrance



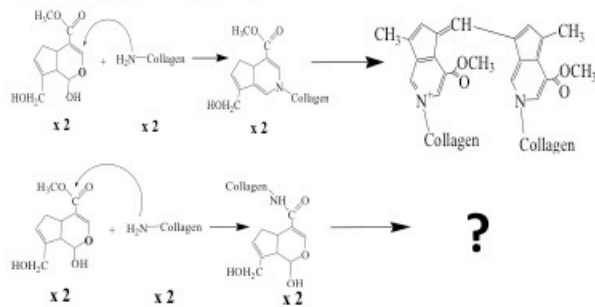
Fruit



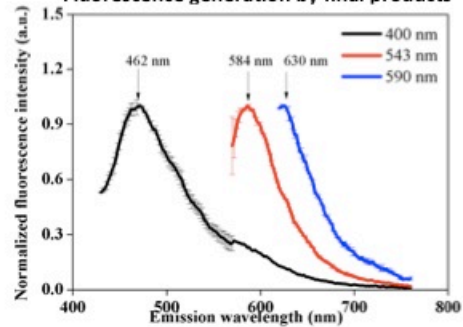
Effect of genipin crosslinking on the optical spectral properties and structures of collagen hydrogels

Applied Materials and Interfaces; doi: 10.1021/am200416h

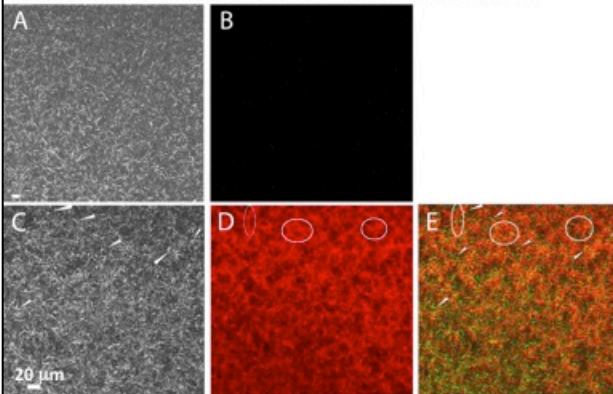
Possible reaction mechanism



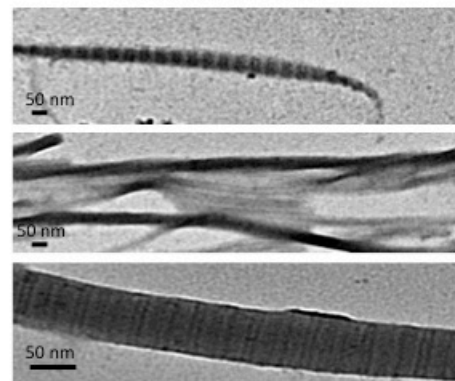
Fluorescence generation by final products



Microstructure alterations + Novel intrinsic fluorescence contrast

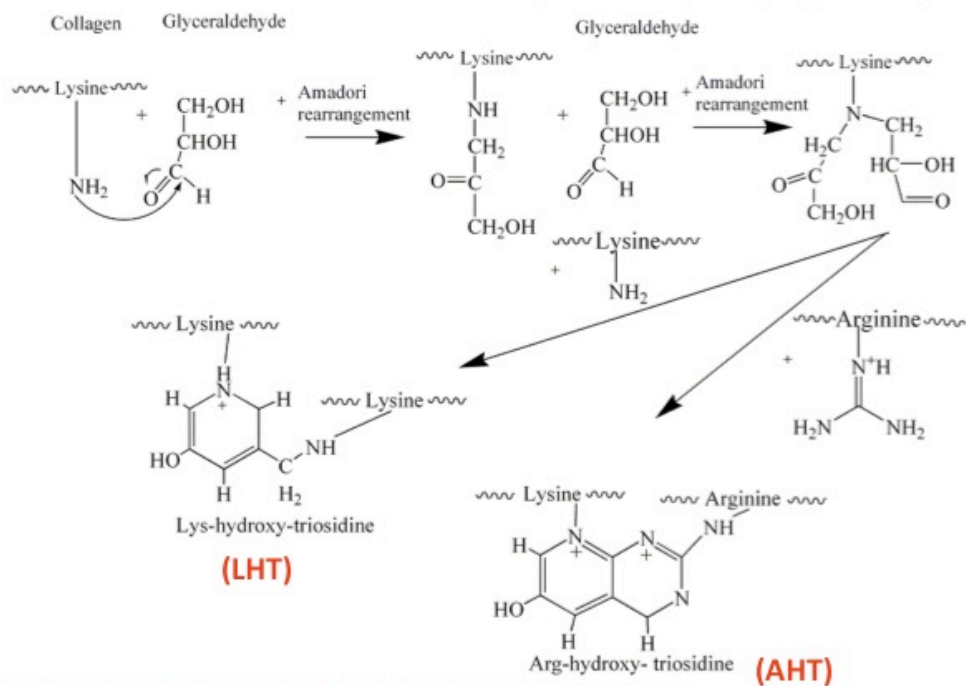


Nanostructure alterations



Analytical Chemistry 83 (1), 200–206 (2011)

Reaction Mechanism of Cross-Linking with Sugars (Glycation)



Advanced Glycation End-products (AGEs) produce fluorescence

AGEs absorb in the near-UV (320-370 nm) and fluoresce in the 380 to 480 nm range

Tessier, F.J.; Monnier, V.M.; Sayre, L.M.; Kornfield, J.A. Triosidines: novel maillard reaction products and cross-links from the reaction of triose sugars with lysine and arginine residues. Biochem. J. 369, 705–719, 2003