UV-crosslinked hydrogels are useful for cell encapsulation and drug delivery, where their viscoelastic properties can influence cell behaviour and drug release. However, methods to test their mechanical properties are destructive and do not allow repeated measurements of the same sample over time.

In this technical note, the ElastoSens™ Bio² was used to evaluate hydrogels from Advanced BioMatrix, a leading provider of biologically-derived hydrogels, after crosslinking under UV light.

Liquid precursor solutions were loaded into removable ElastoSens™ Bio² sample holders. The sample holders were transferred to a UV chamber for irradiation, and then replaced into the ElastoSens™ Bio² for subsequent testing. This allowed repeated measurements on individual samples after various amounts of UV exposure.

UV Crosslinking Increases 3D Collagen Hydrogel Stiffness

PhotoCol®-UV methacrylated collagen 0.6% (6 mg/ml) was allowed to polymerize at 37°C and then crosslinked under 365nm UV lights for 5 and 10 minutes. Irgacure 2959 was used as a photoinitiator. While the gels became stiffer after 5 minutes exposure, there was no increase after 10 minutes of exposure to UV light. This indicates that crosslinking is complete after 5 minutes of UV light exposure.
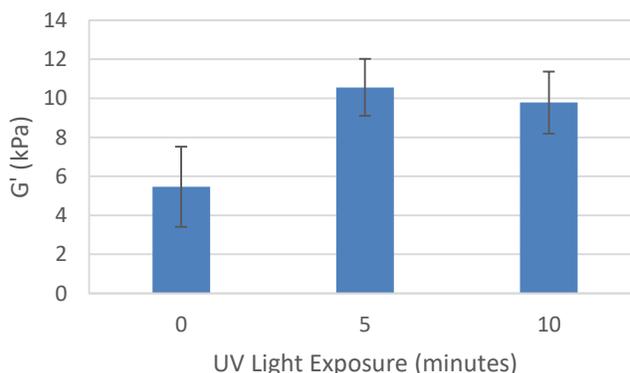
UV Exposure Increases Stiffness in Hyaluronic Acid and Gelatin-based Hydrogels
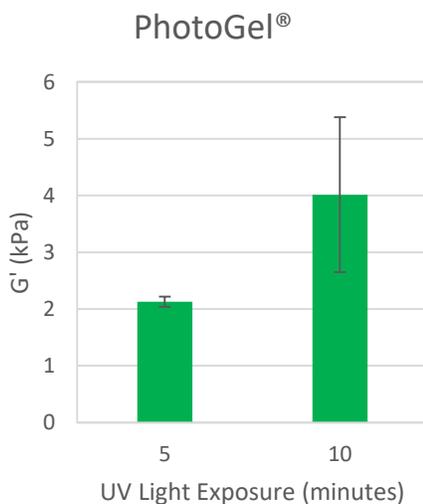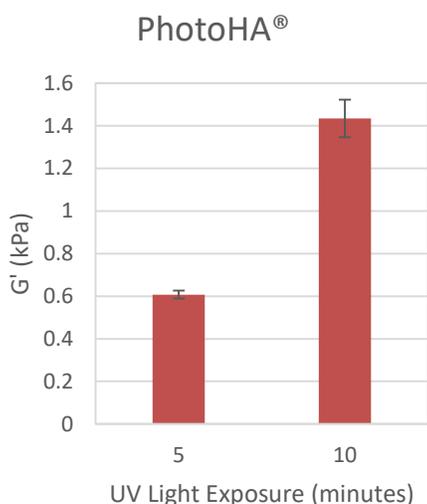
PhotoHA®

PhotoGel®

Room temperature PhotoHA-UV® methacrylated hyaluronic acid 1% (1 mg/ml) and PhotoGel-UV® methacrylated gelatin 10% (100 mg/ml) formed gels after 5 minutes of UV exposure. Their increasing G' shows that they are not fully crosslinked after 5 minutes of UV exposure. At these concentrations, the HA-based hydrogels are softer than gelatin-based, UV-crosslinked hydrogels.

In conclusion, the ElastoSens™ Bio² is capable of analyzing UV-crosslinking gels *in situ*. This novel method of mechanical testing will facilitate measurements of otherwise hard-to-analyze materials, including cell-encapsulating gels or degradable drug-delivery gels.