



Photocrosslinkable Extracellular Matrices

Methacrylated Collagen, Gelatin and Hyaluronic Acid



The Technology

Our “Photo” products are highly purified extracellular matrices that have been chemically modified through methacrylation. These matrices include:

- PhotoCol® Methacrylated Collagen
- PhotoGel® Methacrylated Gelatin
- PhotoHA® Methacrylated Hyaluronic Acid

These products can be photocrosslinked to form 3D hydrogels for cell culture, tissue engineering and bioprinting. Each of the methacrylated matrices come as a lyophilized powder, allowing tunability through both ECM concentration, and photocrosslinking. The shear storage modulus G' for these products can be tuned to form very soft hydrogels similar in softness to brain tissue, or firm hydrogels similar in stiffness to cartilage or muscle.

Tunability

Each product has a high degree of customization and tunability by adjusting:

- ECM concentration
- Photocrosslinking time
- Photocrosslinking intensity
- Choice of Photoinitiator
- Photoinitiator concentration

Before We Get Started...

Testing criteria, parameters, and notes

The gelation data (G' Shear Storage Modulus) represented in this paper was collected using the ElastoSens Bio2 contactless rheometer. For photocrosslinking studies, the rheometer does not detect values <500 Pa, which you will notice on the gelation curves.



Collagen, Gelatin and Hyaluronic Acid samples were prepared according to the DFU and 3 mL's of sample were dispensed into the blue sample cups. The sample is down within the cup, about 1 cm from the top. This could limit exposure to UV light during photocrosslinking.



Irgacure 2959 was the photoinitiator used across all of these studies at concentrations found within the product DFU's. Samples were crosslinked within a UVP CL-1000 box, with 365 nm wavelength bulbs. The energy output of the CL-1000 is $\sim 170,000$ microjoules per cm^2 per minute. The samples are about 6 cm away from the light source.

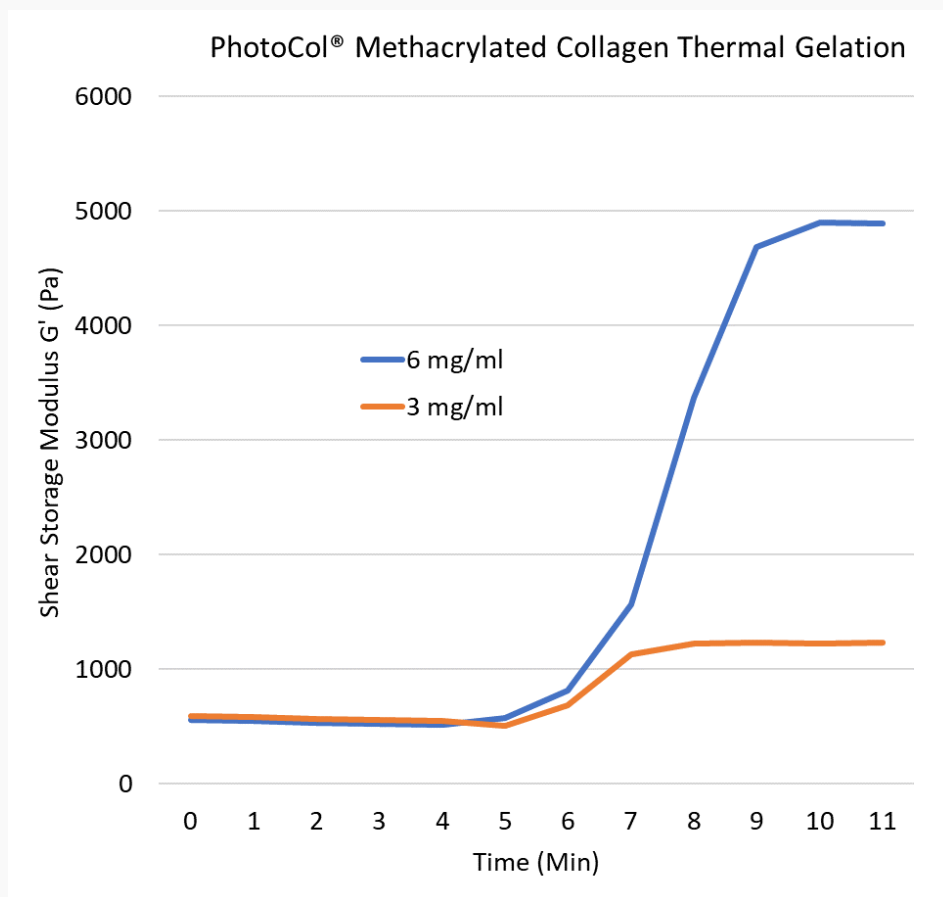


PhotoCol® Methacrylated Collagen

The PhotoCol® kits contain 100 mg of sterile filtered lyophilized methacrylated collagen, a photoinitiator of choice (Irgacure, LAP or Ruthenium), acetic acid for solubilization and a neutralization solution. Recommended working concentration is 2-8 mg/ml.

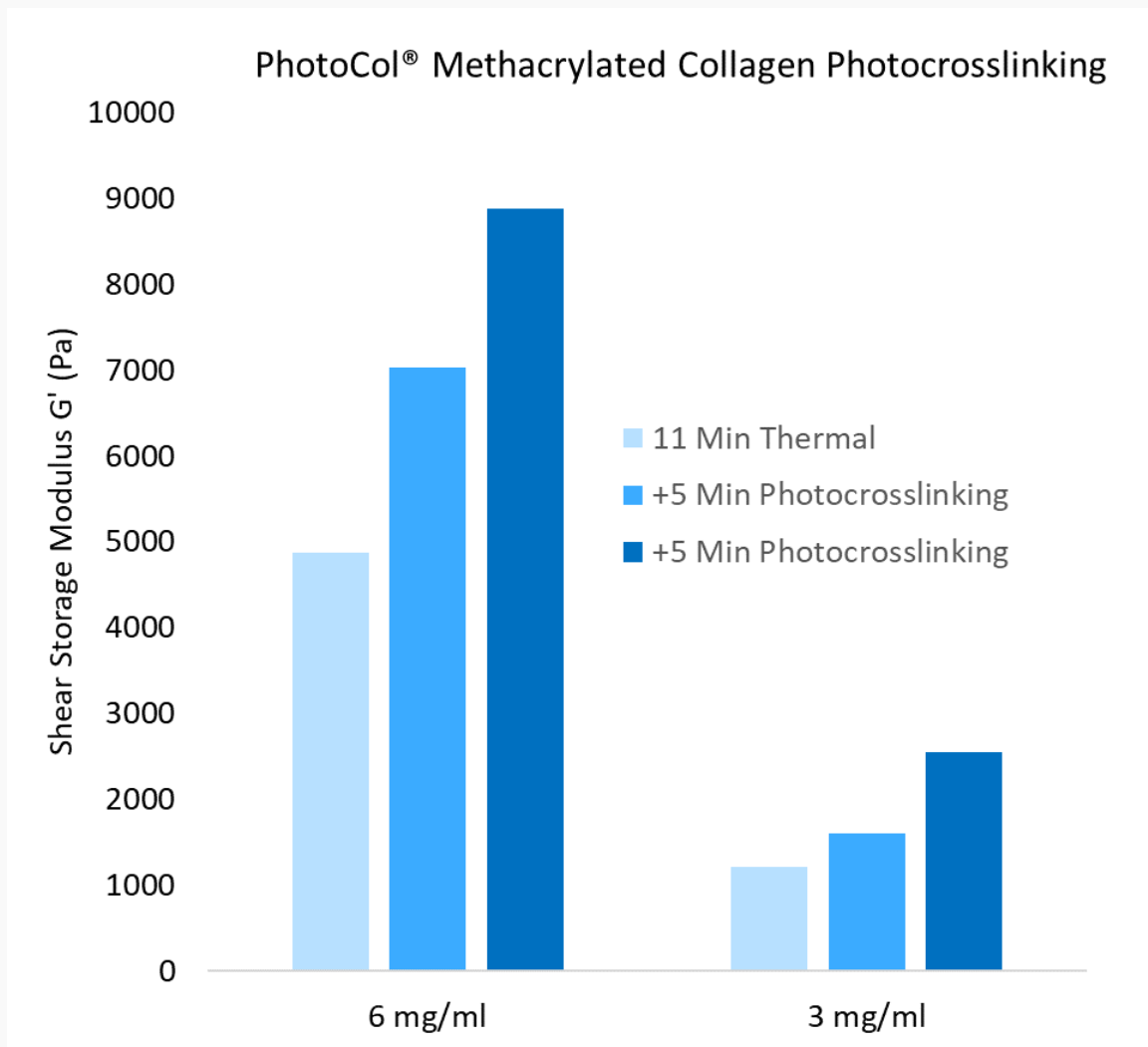


PhotoCol® 3D Hydrogel Rheology – Thermal Gelation



This graph shows thermal gelation (polymerization) of PhotoCol® collagen. Samples were incubated at 37°C for 11 minutes. 6 mg/ml and 3 mg/ml samples show a large difference in hydrogel shear storage modulus G' (Pa), indicating a high degree of tunability simply by altering collagen concentration.

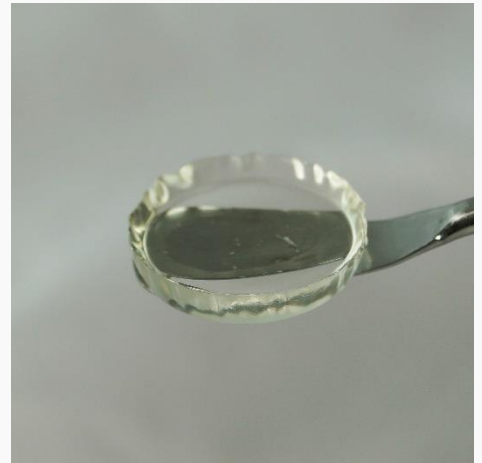
PhotoCol® 3D Hydrogel Rheology – Photocrosslinking



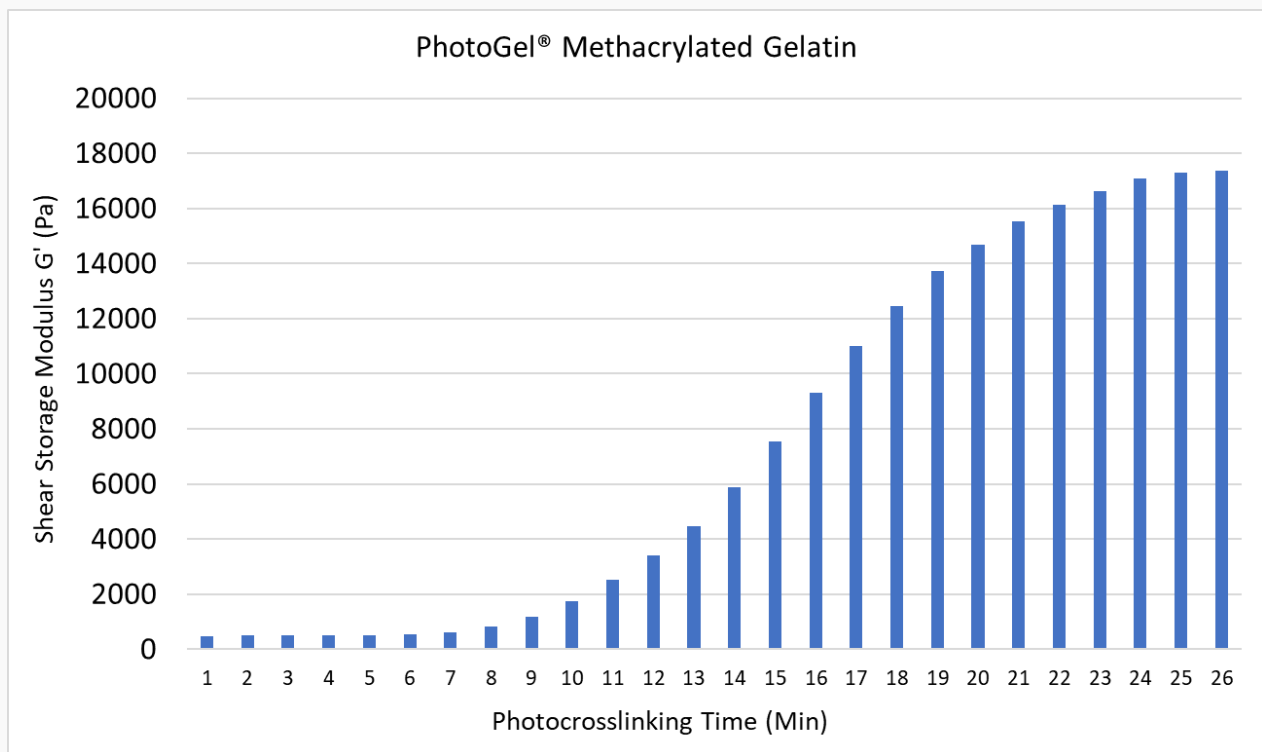
This graph shows shear storage modulus G' (Pa) of PhotoCol® collagen after 11 minutes of thermal gelation (bar 1) and then photocrosslinked for 5 minutes (bar 2) and then photocrosslinked for an additional 5 minutes (bar 3). 6 mg/ml and 3 mg/ml samples show a large intrasample difference in hydrogel shear storage modulus G' (Pa), indicating a high degree of hydrogel tunability via photocrosslinking.

PhotoGel[®] Methacrylated Gelatin

The PhotoGel[®] kits contain 1 gram of sterile filtered, lyophilized methacrylated gelatin and a photoinitiator of choice (Irgacure, LAP or Ruthenium). Recommended working concentration is 50-200 mg/ml.



PhotoGel[®] 3D Hydrogel Rheology – Photocrosslinking



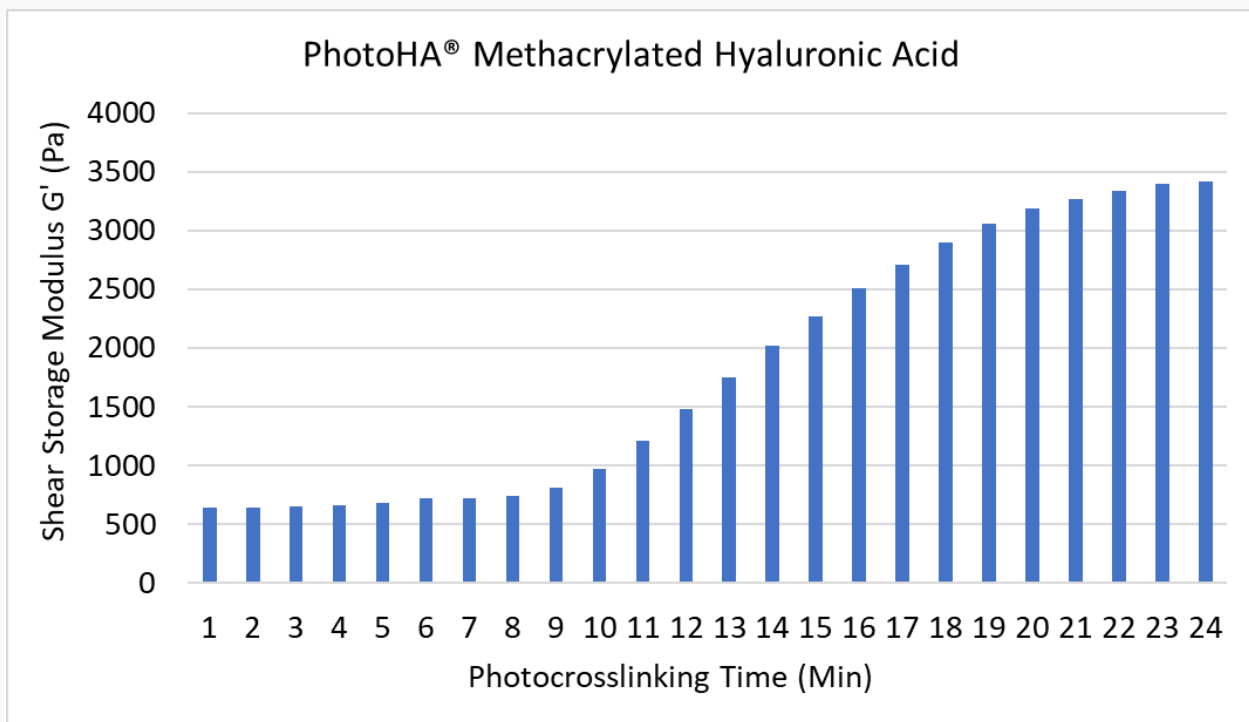
This graph shows shear storage modulus G' (Pa) of PhotoGel[®] gelatin. The sample was prepared as a 10% (100 mg/ml) solution. PhotoGel[®] was then photocrosslinked for 1 minute at a time for 26 consecutive minutes. PhotoGel[®] hydrogels demonstrate a massive range of hydrogel strength making it our most tunable hydrogel available. Remember, PhotoGel[®] can also be prepared at significantly lower or higher concentrations.

PhotoHA[®] Methacrylated Hyaluronic Acid

The PhotoHA[®] kits contain 100 mg of sterile filtered, lyophilized methacrylated hyaluronic acid and a photoinitiator of choice (Irgacure, LAP or Ruthenium). Recommended working concentration is 5-20 mg/ml.



PhotoHA[®] 3D Hydrogel Rheology – Photocrosslinking



This graph shows shear storage modulus G' (Pa) of PhotoHA[®] Hyaluronic Acid. The sample was prepared as a 1% (10 mg/ml) solution. PhotoHA[®] was photocrosslinked for 1 minute at a time for 24 consecutive minutes. PhotoHA[®] hydrogels are highly transparent, crosslinkable and tunable, while providing a native environment for tissue engineering.

Ordering Information

Description	Photoinitiator	Catalog Number
PhotoCol® Methacrylated Collagen Kit	Irgacure	5201
	LAP	5270
	Ruthenium	5271
PhotoGel® Methacrylated Gelatin Kit	Irgacure	5215
	LAP	5272
	Ruthenium	5273
PhotoHA® Methacrylated Hyaluronic Acid Kit	Irgacure	5220
	LAP	5274
	Ruthenium	5275

To order product or learn more,
visit our website at
www.AdvancedBioMatrix.com

Advanced BioMatrix Data Disclaimer

The gelation data (G' shear modulus) was collected using the ElastoSens Bio2 contactless rheometer. Other testing methodologies use different measurements, sample volumes, pH, temperatures, gelation parameters, moduli, etc.. and may give different results than the values seen in the graphs above. Furthermore, additional parameters including photoinitiator concentration, light wavelength, sample mixing, preparation, light intensity, crosslinking time, type of rheometer and testing methods and many more additional variables may contribute to potential differences in data when trying to replicate these experiments in your lab.