

## Rheology of PhotoGel® 50% DOM at Concentrations 5%, 10%, and 20% with Photoinitiator LAP

*Abstract: The following experiment was conducted to determine the viscoelastic behavior of PhotoGel® 50% DOM at Concentrations 5%, 10%, and 20% with photoinitiator LAP. The results can be seen in the graph below.*

PhotoGel® 50% DOM is a methacrylated gelatin (GelMA) that can be photocrosslinked to form hydrogels. Various parameters can be tuned to optimize the gelation kinetics and rheological properties of the 3D hydrogels, including concentration of gelatin, crosslinking time, photoinitiator intensity, etc...For stiffer hydrogels, evaluate the 95% DOM PhotoGel®.

### Materials

Name/Description	Part Number	Lot Number
PhotoGel® 50% DOM	VL3500000050	8797
LAP	-----	-----

### Procedure

#### *Material Preparation*

All gel preparation was performed as per the DFU on [www.advancedbiomatrix.com](http://www.advancedbiomatrix.com). PhotoGel® was solubilized in 1x PBS at 5%, 10%, and 20% concentrations and combined with the photoinitiator LAP at a 0.034% concentration. Each test was run in duplicate or triplicate.

#### *ElastoSens*

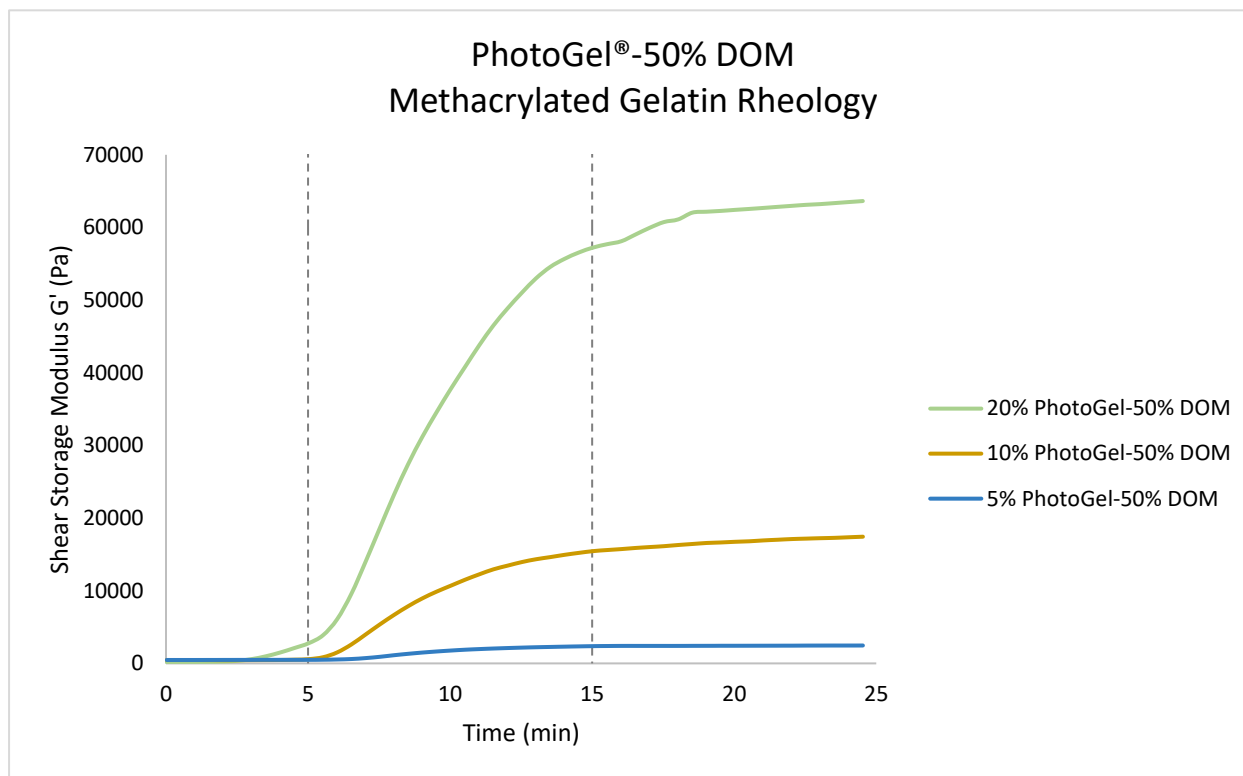
For each test ~2g of sample was added to the large testing cup. The parameters of the tests were as follows:

- Overall
  - o Stiff sample (with a large testing cup).
  - o Test duration: ~25 min.
  - o Time step: 30s.
  - o Temp: 20C.
- Stages
  - o 1: 5 min at 20C – to allow the sample to equilibrate at 20C.
  - o 2: 10 min at 20C with 405 nm light on at 100% intensity (23.9 +/- 2.8 mW/cm<sup>2</sup>) – photocrosslinking stage.
  - o 3: 10 min at 20C – resting period to observe any aftereffects of the light exposure.

The ElastoSens procedure was fully automated and allowed to run to completion once started.

### Results

The resulting graphs of each test can be seen in Figure 1 and the averaged values of the tests run in duplicate can be seen in Figure 1. The averaged final stiffnesses of each gel can be seen in Table 1. A 2x change in concentration can lead to a large change in resulting hydrogel stiffness.



*Figure 1. Averaged (across 2-3 runs) viscoelastic graphs for PhotoGel® 8797 medium DOM at concentrations 5%, 10%, and 20%, crosslinked with LAP. Dashed lines indicate the period (5-15 min) the samples were exposed to 405 nm light for photocrosslinking.*

*Table 1. Maximum recorded stiffness of the averaged viscoelastic runs for PhotoGel® 50% DOM at concentrations 5%, 10%, and 20%.*

PhotoGel® 50% DOM Concentration	Shear Storage Modulus $G'$ (Pa)
5%	2461
10%	17436
20%	63634