

## Introduction

- Current studies in Dr. Shen's lab includes the study of cancer cells in different microenvironments and conditions.
- Some of the said conditions include varying oxygen levels in which the cell lines are maintained and developed.
- The study also focuses on regulating conditions to closely match laboratory experiments to *in vivo* phenomenon.
- Different materials are especially used to observe these events, one of many being gelatin methacrylate (GelMA).

## Significance of GelMA

- GelMA allows us to study 3D cell extracellular matrix interactions.
- GelMA also reinforces the use of 3D models to simulate laboratory experiments so that its conditions are best made similar to actual tumor sites.
- By calculating and observing the mass swelling ratio, we can approximate the overall characteristics and porosity of GelMA.
- We can use these traits of GelMA to predict cell and particle behavior.

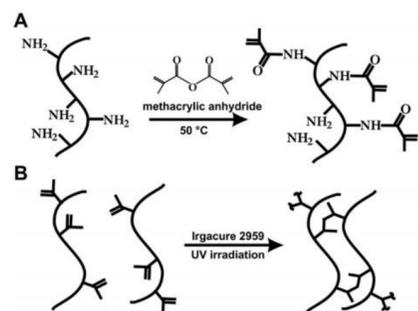


Figure 1. The diagram represents the synthesis of gelatin methacrylate in terms of chemical formulas.

## Methods

- A stock solution of 10% GelMA was pipetted into a 24-well plate, 400  $\mu$ l in each well.
- The GelMA solutions in the wells were crosslinked with UV light at 12% intensity.
- Half the samples were crosslinked for 60 seconds; the other half, 120.
- The crosslinked GelMA samples were placed into a petri dish containing solution of PBS, and left to swell for 48 hours.
- The mass of each sample was recorded, and the samples were snap-frozen to be transported for lyophilization for another 48 hours.
- The masses of the samples after lyophilization were recorded, and the swelling ratio of GelMA was calculated.



Figure 2. The cured GelMA sample is placed in PBS



Figure 3. The sample is lyophilized and weighed again.

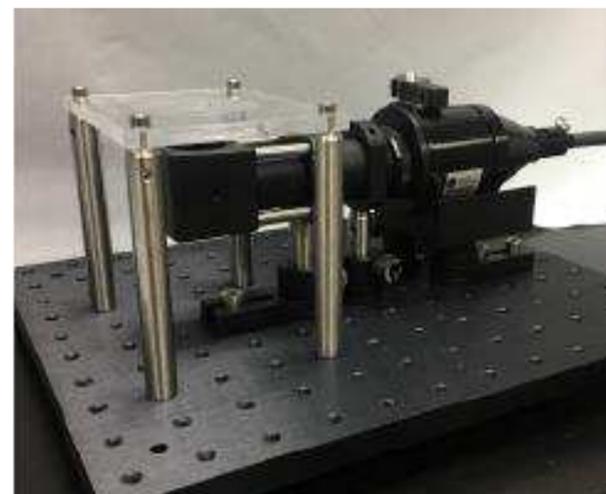


Figure 4. The samples of GelMA are cured by being placed atop the glass sheet of this device, where the UV ray is emitted. PC: Yuta Ando

## Results

- Given the small difference in the mass swelling ratio between the samples of different curing time, this specific variable does not significantly influence the results.
- The difference in curing time, especially using 12% intensity of UV light, is not a significant variable in changing the swelling mass ratio.

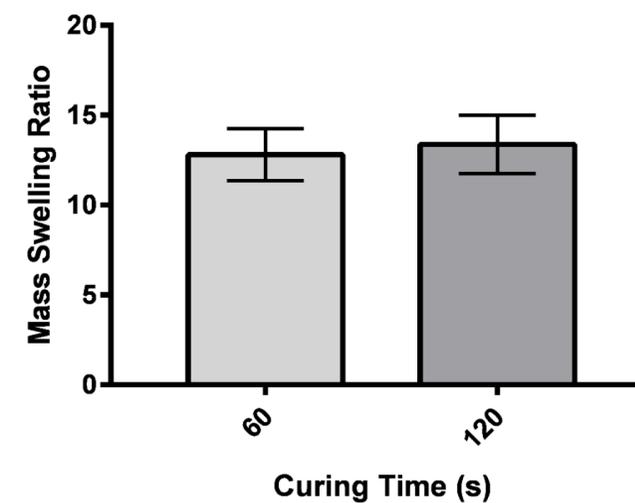


Figure 5. The diagram represents the difference of the mass swelling ratio between the samples that were cured for 60 seconds, as compared to those cured for 120 seconds.

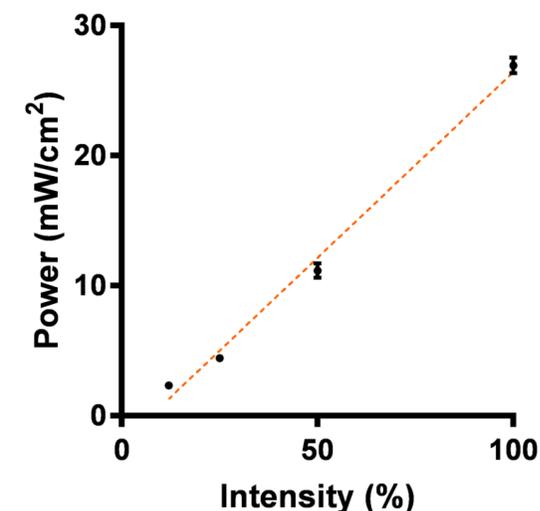


Figure 6. The diagram represents the numeric correlation between the intensity, in percentage, of UV light as compared to the power, in mW/cm<sup>2</sup>.



## Skills Learned

- I learned technical skills used in laboratory settings
- I learned that experiments and research requires patience and consistency.
- The entire process involves repetitive trial and error to fix past mistakes and enhance overall efficiency of the experiment.
- The greater number of trials, the more accurate the results.

## Reference

Nichol, J. W., Koshy, S. T., Bae, H., Hwang, C. M., Yamanlar, S., & Khademhosseini, A. (2010). Cell-laden microengineered gelatin methacrylate hydrogels. *Biomaterials*, 31(21). <https://doi.org/10.1016/j.biomaterials.2010.03.064>

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