

# Protein Micro-Gel Extracellular Matrices for Maintained Cell Phenotype

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## Background

- Chronic wounds affect 6.5 million patients in the U.S.
- Diabetes affects 23 million people
  - Diabetic neuropathy increases risk of chronic wound
- Elastin like polypeptides are biocompatible, simple and easy to synthesize

## Hypothesis and Objectives

- Gels will form at pH of 8.0 (Crosslinked by BS3)
- Cells will be encapsulated if in same solution as ELPs
- Goal: To create a biocompatible gel to encapsulate mammalian cells

## Results and Conclusions



Figure 1.  
BS3-ELP gels

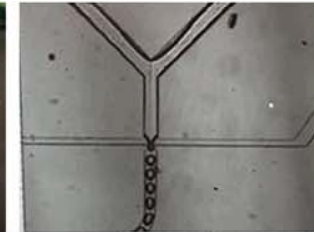


Figure 2  
PDMS device with ELP and BS3 in a biphasic flow forming micro gels.

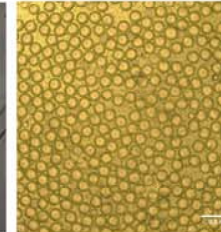


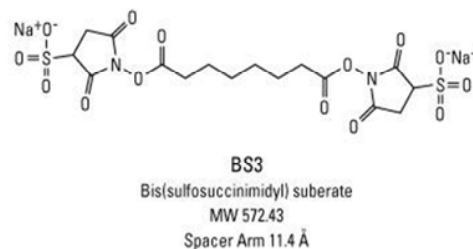
Figure 3  
BS3-ELP micro gels

(Figure 1) From left to right BS3 crosslinker was added starting at 1.0 mg in the first one and incrementing by .25 mg. The third one shown was the one that formed the stiffest gel and therefore was concluded that the ideal conditions for making a gel are at a pH of 8.0 and a 1.5 mg of BS3 per 150 uL of ELP E3 at 100 mg/ml concentration

Using these same concentrations that were found in the previous experiment, we formed gels (Figure 3) through the use of a PDMS device (Figure 2). These gels took about an hour to form.

## Materials and Methods

- Materials
- E3 (bis(sulfosuccinimidyl)suberate)
- Elastin like Polypeptides (E3 strand)
- E. Coli
- PDMS Device
- Oil with albumin



## Methods

- Bacterial Cell culture to synthesize ELPs
- ELP purification through cell lysis and ITC
- Mammalian Cell Culture
- PDMS microfluidic device fabrication

## Future Directions

- Live Dead Assays
- Explore rheology of gels
- Directed stem cell phenotype
- Bio printing of gels



Image obtained from: [https://i3.amazonaws.com/flint-prod-spark/prod/s3fs-public/styles/medium\\_5\\_by\\_3\\_scale\\_crop/public/blog/primary-image/bioprinting.jpg?tok=Dj2C21\\_](https://i3.amazonaws.com/flint-prod-spark/prod/s3fs-public/styles/medium_5_by_3_scale_crop/public/blog/primary-image/bioprinting.jpg?tok=Dj2C21_)