Photopatterning of Methacrylated Ligands for Spatial Control of SynNotch Receptors

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Abstract

- Engineered human tissue doesn't allow spatial control of cells in multi-cell tissues and results in poor representation of true physiology.
- I spatially controlled synNotch activated cells by UV-activated crosslinking of chemically modified GFP onto Gelma.
- The crosslinking resulted in a high density of GFP in the region of UV exposure and cellular activation occurred more often in the area.

Figure 1

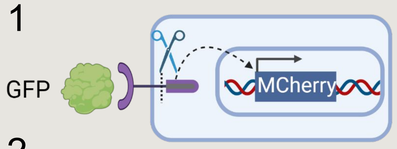
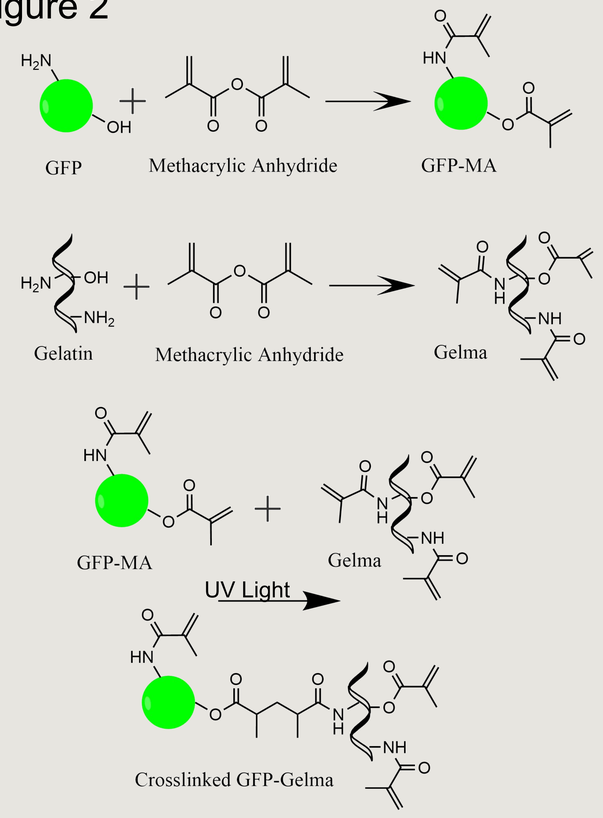
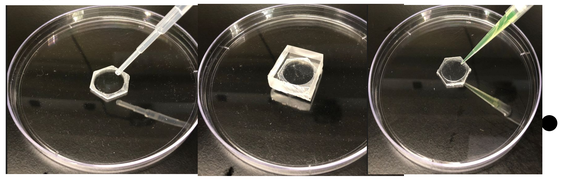


Figure 2



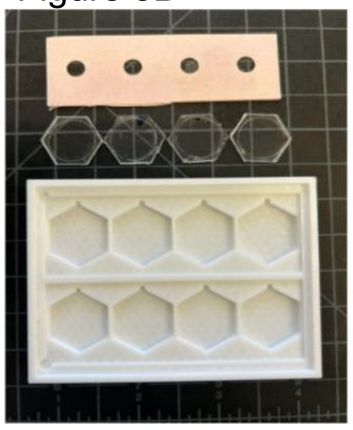
Methods

Figure 3A



- Gelma is added to the exposed section of the coverslip.
- PDMS is added on top to stamp down gelma
- GFP and photoinitiator is mixed in and placed on the gel.

Figure 3B

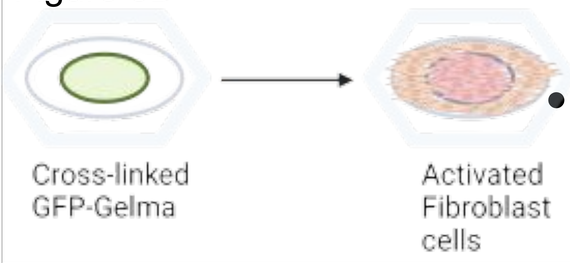


- Photomasks are made from laser engraved taped glass.
- Coverslips are placed into 3D mold with photomask layed on top.

Figure 3C

- Device from Figure 3B is placed into light box.
- Time and intensity determined by Figure 5.

Figure 3D



- GFP is crosslinked to gelma in UV exposed region(see Figure 2).
- Fibroblasts are seeded on top with activation occurring when in contact with the GFP.

Results

Figure 4A

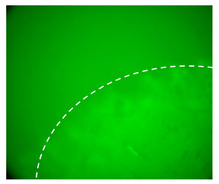


Figure 4B

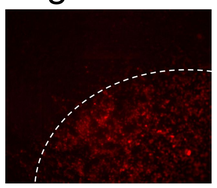


Figure 4C

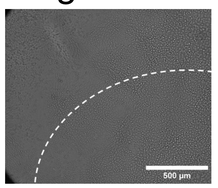


Figure 5

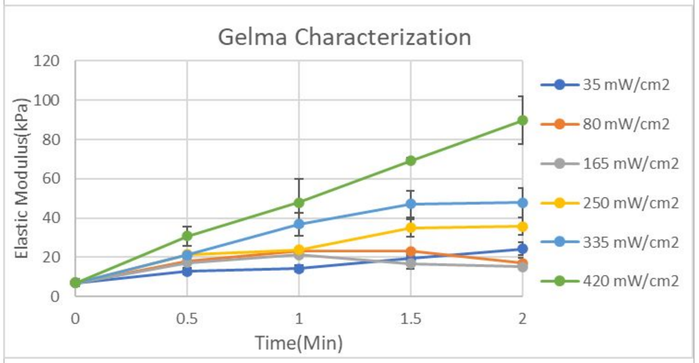


Fig 4. Activated SynNotch cells on photopatterned GFP **Fig. 4A.** GFP **Fig. 4B.** mCherry **Fig. 4C.** Brightfield

Conclusion

- This process will eventually lead to controlled cell differentiation to represent tissues of multiple cell types like neuromuscular junctions.
- The modification can be used on any protein and future studies can go beyond synNotch and cellular differentiation.
- The impact of more physiological accurate engineered tissues is faster drug production, less dependency on animal models, and eventually lab grown organs.

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