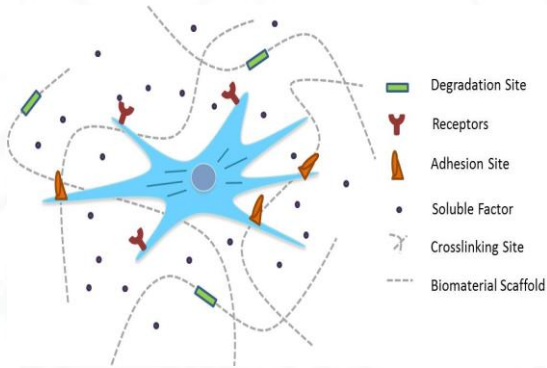


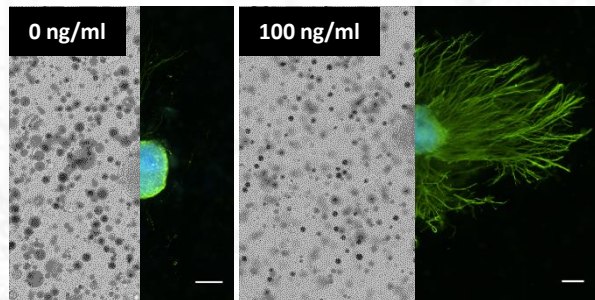


Cell Microenvironment



We know that cells respond their microenvironment. In our lab, we aim to understand how material properties affect cellular responses.

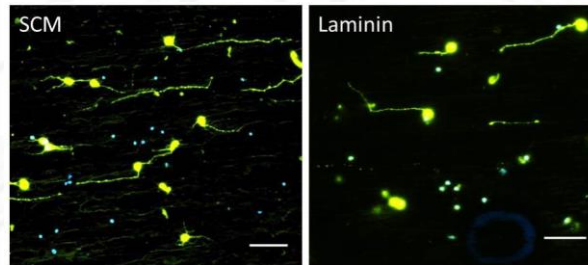
Chemical cues - microspheres



Chemical cues were incorporated into the scaffolds using PLGA microspheres and evaluated in a rat sciatic nerve injury model. DRGs were cultured on scaffolds with NGF microspheres and empty microspheres. Neurite outgrowth length can be controlled by varying the concentration of NGF incorporated or changing the L:G ratio on PLGA.

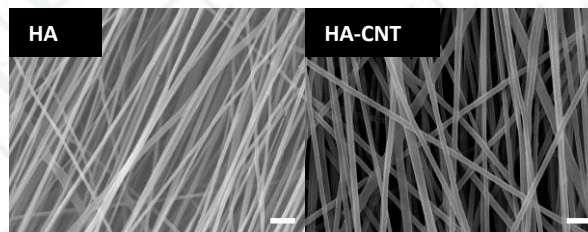
Spinal Cord Matrix - Adhesion

Spinal cord matrix (SCM) was derived by isolating proteins from fresh-frozen porcine spinal cords. Spinal cord neurons were plated on SCM coated hyaluronic acid (HA) fibers. After 24 hours, neurite outgrowth was visibly longer on SCM scaffolds than cells cultures on laminin coated HA. Neurite outgrowth was evaluated in the presence of CSPG (CSA) and SCM was able to overcome these negative cues potentially due to upregulation of Syndecan-3

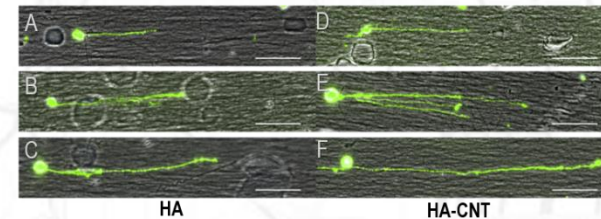
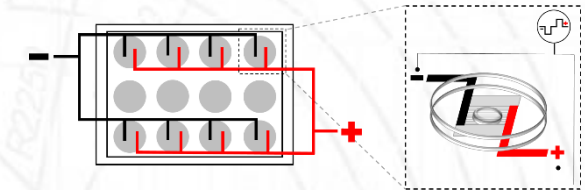


Conductive Scaffolds

Multi-walled carbon nanotubes are incorporated into HA fibrous scaffolds in order to render scaffolds conductive. (scale=1µm) CNTs are carboxylated and 0.01 wt% CNTs are included in the electrospinning solution. DRGs cultured on the scaffolds show robust growth after four days of culture. (scale=250µm)



Cells are stimulated using a custom-built stimulation chamber as shown below. Neurons show increased neurite growth and viability on HA-CNT scaffolds with increased stimulation time.



Dose dependent effect of signal duration on: Neuron Growth Neuron Viability

