Condensed Matter Seminar

Date:  Friday , October 12, 2:00- 3:00pm, Room 245 in Physics building

Speaker: **Dr. Harini G. Sundararaghavan**(Department of Biomedical Engineering, WSU)

Title: Three dimensional gradient scaffolds for neural tissue engineering

Abstract:

Spinal cord injury (SCI) often results in damaged axons and has devastating
consequences for patients in terms of physical disabilities, and enormous
emotional, personal, and fiscal tolls. Following SCI, the injury site is not
conducive to neurite outgrowth due to the environment and the formation of
the glial scar, which creates a chemical and physical barrier, preventing
the reconnection of healthy neurons.  In order to develop a treatment for
spinal cord repair this scar tissue needs to be replaced with healthy,
functional tissue. Gradients of mechanics, adhesion and chemical factors
have been shown to be presented in vivo during development in neural tissue.
We believe mimicking these gradients will be important in creating a bridge
material that not only promotes neurite outgrowth but also directs growth.
We have previously fabricated mechanical and adhesive gradients in collagen
hydrogels and shown the ability to direct neurons, however mechanical and
adhesive control in collagen is limited. Electrospun hyaluronic acid (HA)
scaffolds are advantageous because we have control over mechanics, adhesion,
degradation and porosity (through photocrosslinking). Electrospinning was
used to mimic natural fibrous tissue and HA was chosen because it allows for
facile chemical modification. We have shown the ability to create
haptotactic and durotactic fibrous scaffolds and have tested directed cell
growth with endothelial cells. Future work will investigate HA-based
scaffolds patterned to mimic neural tissue with gradients of mechanics,
neural-specific peptides, growth factors and mechanical and electrical
stimulation. Additionally, electrospun HA scaffolds have the added advantage
of topographic control, where neurite outgrowth can be directed by fiber
alignment.