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.