MECHANICAL AND AEROSPACE ENGINEERING DEPARTMENT SEMINAR

Thursday, February 16, 4:00 PM, BR3216
Speaker: Marian McCord
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TITLE: Thermally Responsive Polymer Surfaces for Tissue Engineering

Grafting of thermally responsive polymers onto the surface of conventional polymers and textiles may be used to create novel materials for tissue engineering and other applications. These surfaces undergo significant morphological changes as temperature approaches the lower critical solution temperature (LCST) for the grafted polymer. Poly-n-isopropylacrylamide (PNIPAM) surfaces have been shown cell adherence and spreading at temperatures above the LCST (32C), and spontaneous cellular detachment at temperatures below the LCST. Thermal detachment from thermally responsive surfaces represents an alternative to enzymatic cell/tissue recovery, and yields cell sheets with intact intercellular junctions and differentiated functions. These sheets of cells can be used singly, or stacked to form homo- or heterogeneous multi-layered tissue constructs. Flexible porous tissue culture substrates for cell sheet engineering functionalized by PNIPAM represent a new mechanism for promotion of large areas of single cell, cell sheets, and eventually, 3-D tissue expansion.
Atmospheric plasma grafting of functional polymer surfaces is a scaleable technology for graft polymerization of fabrics and films. We have successfully used this technique to create fabrics, films, and tissue culture plates that show thermally responsive wettability. The grafted tissue culture plates bind and release cells in response to thermal cues.
We are working to characterize the grafted polymer and to optimize the process to create novel fabric tissue culture substrates.