

**Microreactor Model Development for Cell-Bacteria Co-Culture
in Orthopaedic Implant Infection by *Staphylococcus epidermidis* Biofilm**

J. H. Lee and W. Y. Lee
New Jersey Center for MicroChemical Systems
Department of Chemical, Biomedical and Materials Engineering
Stevens Institute of Technology
Hoboken, New Jersey 07030

Microreactors were designed and fabricated, and are being tested in an iterative manner for studying cell-bacteria-biomaterial interactions in microfluidic environments. We observed that microenvironments exert an important role in determining biofilm morphology and eukaryotic cell adhesion and spreading. The adhesion, growth and dispersal of biofilm-producing *Staphylococcus epidermidis* were observed as characterized by microscopic imaging and by effluent analysis. On the other hand, fibroblast cell adhesion and spreading were restricted by narrow and shallow dimensions of the microenvironments. Therefore, *S. epidermidis* bacteria appeared to be more viable in the 3-D microscale environments than fibroblast cells. This work is being conducted in our attempt to develop a more predictable *in vitro* model for orthopaedic implant infection