

Dr. Joseph Charest, Draper Laboratory

Replicating Organ and Tissue Function with Microfabricated Systems

Abstract: Organ failure is an obviously serious medical condition with a very widespread impact. To limit organ failure, *in vitro* predictive models replicate organ and tissue function to screen pharmaceuticals for toxicity to organs and test efficacy of organ therapies. To treat patients with failing or failed organs, organ-assist medical devices replicate functions of organs by processing patient's blood to supplement the native organ function. In both cases, microfabricated systems can mimic components of native tissue resulting in realistic *in vitro* models as well as medical devices with improved efficiencies and decreased side effects.

Bio: Dr. Charest is director of *in vitro* model and organ-assist work at Draper Laboratory. The work of his teams leverages micro- and nano-fabrication along with advanced machining techniques to create systems which recapitulate native tissue and organ architecture, morphology, and function *in vitro*. The systems span applications from medical devices to screening platforms for pharmaceuticals, and impact fields of use in various organ and tissue types such as tumor, kidney, vascular tissue and lung. Dr. Charest graduated from Georgia Tech with an MS and PhD in Mechanical Engineering and from Penn State with a BS in Mechanical Engineering.