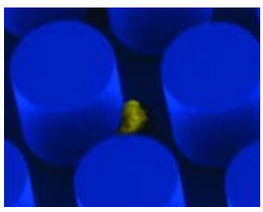
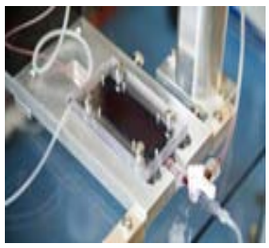
Center for Nanoscale
Chemical-Electrical-Mechanical
Manufacturing Systems

Microchip Technologies in Biology and Medicine

Biomedical applications of microfabricated devices is no longer limited to non-living systems as genes-on-a-chip or lab-on-a-chip, recent advances in the understanding of cellular behavior in micro-environments have started to pave the way toward living micro-devices. These emerging devices are expected to become key technologies in the 21st century of medicine with a broad range of applications varying from diagnostic, tissue engineered products, cell-based drug screening tools, and basic molecular biology tools. They will also include multiple cell types and/or genetically engineered cells to investigate complex interactions between cells from different tissues. These sophisticated devices will contain micro-engineered tissue units coupled to each other by complex microfluidic handling network. Microfluidic mixing systems will also precisely regulate the composition and concentration of drugs to be tested microchips to isolate rare cells from blood for diagnostics purposes. This presentation will briefly review the literature on the use of microtechnologies in cellular systems and then focus on a number of applications, especially to those in blood diagnostics in cancer, HIV/AIDS and global health, and burns and trauma.





Wednesday, Dec. 3, 2008
4:00 PM
1000 Micro and Nanotechnology Laboratory
Reception to follow Seminar

Mehmet Toner, Ph.D.
Massachusetts General Hospital, Harvard Medical School
Harvard-MIT, Division of Health Sciences and Technology

Dr Mehmet Toner is a Professor of Surgery and Biomedical Engineering at the Harvard Medical School and Massachusetts General Hospital (MGH) and is a member of the Senior Scientific Staff at the Shriners Hospital for Children. Dr. Toner is also a Professor of Health Sciences and Technology at Harvard-Massachusetts Institute of Technology, Division of Health Sciences and Technology. Dr Toner serves as the Co-Director of the Center for Engineering in Medicine at Harvard Teaching Hospitals, and Director of the BioMicroElectroMechanical Systems (BioMEMS) Resource Center at the MGH. He is also the Director of the Biomedical Engineering Research and Education Program for physicians at Harvard Teaching Hospitals. Dr Toner received a Bachelor of Science degree from Istanbul Technical University and a MS degree from the Massachusetts Institute of Technology (MIT), both in Mechanical Engineering. Subsequently he completed his PhD degree in Medical Engineering at Harvard-MIT Division of Health Sciences and Technology in 1989. Dr Toner's research interests include biostabilization, tissue engineering, and microsystems bioengineering. Dr Toner has received funding from NIH, NSF, DARPA, Whitaker Foundation, National Textile Center, and many industrial outfits. He has published over 160 scientific publications and has delivered over 250 invited and scientific meeting presentations.