



## Biomedical Engineering

### *Seminar Announcement*

Developing Several Separate Types of CD-Based Fluidic Platforms  
for Genomic Point of Care Tests (GPOCT)



Friday, December 12, 2008  
10:00 AM  
EC 2300

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*Before joining UCI as the Chancellor's Professor in Mechanical and Aerospace Engineering (MEA), Dr. Madou was Vice President of Advanced Technology at Nanogen in San Diego, California.*

Our team at UCI has developed several separate types of CD-based fluidic platforms for Genomic Point of Care Tests (GPOCT). In this work, we wish to develop an integrated portable system that combines sample preparation, nucleic acid extraction, concentration, purification, PCR amplification, and detection. Fluidic components will all be integrated onto one plastic CD (see figure below). In CD-fluidics the fluid propulsion is controlled by the application of centrifugal force through a rotary motor at the hub of the CD. Several different analytical functions can be integrated into the CD by balancing centrifugal and capillary forces. While pumping mechanisms in other microfluidic devices strongly depend on the properties of fluids, e.g. pH or ionic strength, the centrifugal force induced by spinning the CD provides pumping pressure independent of these properties of the fluids (clinical samples). When the centrifugal force overcomes the capillary force holding a liquid in an embedded reservoir, the fluid is pumped to a next chamber. The fluidic valves in the CD platform are based on the capillary force which is enhanced by scaling down the size of the capillaries. These valves are opened by exceeding a critical rotations-per-minute (RPM) (called burst frequency) where the centripetal force overcomes the capillary force controlling the release and flow of the fluid. We strongly believe that this system can be battery-operated and miniaturized to a highly adaptable small portable molecular diagnostic device.