Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

A microfluidic two-pump system inspired by liquid feeding in mosquitoes ANDREW MARINO, Virginia Tech, ANGELA GOAD, Carroll County High School, MARK STREMLER, JOHN SOCHA, SUNGHWAN JUNG, Virginia Tech — Mosquitoes feed on nectar and blood using a two-pump system in the head-a smaller cibarial pump in line with a larger a pharyngeal pump, with a valve in between. To suck, mosquitoes transport the liquid (which may be a multi-component viscous fluid, blood) through a long micro-channel, the proboscis. In the engineering realm, microfluidic devices in biomedical applications, such as lab-on-a-chip technology, necessitate implementing a robust pump design to handle clogging and increase flow control compared to a single-pump system. In this talk, we introduce a microfluidic pump design inspired by the mosquito's two-pump system. The pumping performance (flow rate) in presence of impurities (air bubbles, soft clogs) is quantified as a function of phase difference and volume expansion of the pumps, and the elasticity of the valve.

Andrew Marino
Virginia Tech

Date submitted: 06 Nov 2015 Electronic form version 1.4