Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Concentration of Micro and Nanoparticles in Sessile Droplets Using Asymmetric Surface Wave Irradiation JAMES FRIEND, LESLIE YEO, HAIYAN LI, MicroNanophysics Research Laboratory, Monash University — A rapid particle concentration method in sessile droplets and confined fluid chambers has been developed using asymmetric surface wave propagation on a substrate upon which the droplet is placed. Nanometre-order vibration induced along the substrate at frequencies from 8 to 125 MHz generate a combination of forces upon suspended particles and the fluid droplet itself via diffraction to provide localized agglomeration of nanoparticles into microstructures, followed by rapid collection of the microstructures to a single point at the centre of the droplet in about 2 to 30 seconds. This is far faster than other currently available particle concentration mechanisms due to the large convective velocities achieved using the device. The ability to control the collection via surface wave power and the effect of scale on the collection time and scheme of agglomeration are explained via a physical model, verified using fluorescent polystyrene particles from 20 nm to 45 microns in diameter. The usefulness of the method for bioparticles is illustrated through rapid concentration of yeast and mouse mesenchymal stem cells which remain viable and functional after concentration.

James Friend
MicroNanophysics Research Laboratory, Monash University

Date submitted: 01 Aug 2007 Electronic form version 1.4