Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Microfluidics of soft granular gels RYAN NIXON, Univ of Florida - Gainesville, TAPOMOY BHATTACHARJEE, W. GREGORY SAWYER, THOMAS E. ANGELINI, University of Florida — Microfluidic methods for encapsulating cells and particles typically involve drop making with two immiscible fluids. The main materials constraint in this approach is surface tension, creating inherent instability between the two fluids. We can eliminate this instability by using miscible inner and outer phases. This is achieved by using granular micro gels which are chemically miscible but physically do not mix. These microgels are yield stress materials, so they flow as solid plugs far from shear gradients, and fluidize where gradients are generated – near an injection nozzle for example. We have found that tuning the yield stress of the material by varying polymer concentration, device performance can be controlled. The solid like behavior of the gel allows us to produces infinitely stable jets that maintain their integrity and configuration over long distances and times. These properties can be combined and manipulated to produce discrete particulate bunches of an inner phase, flowing inside of an outer phase, well enough even to print a Morse code message suspended within flow chambers about a millimeter in diameter moving at millimeters a second.

Ryan Nixon
Univ of Florida - Gainesville

Date submitted: 11 Jan 2016 Electronic form version 1.4