Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Uniform Yeast Cell Assembly Based on Microfluidic Microgels
YA-WEN CHANG, PENG HE, Artie McFerrin Department of Chemical Engineering, Texas A&M University, College Station, TX, MANUEL MARQUEZ, YNano LLC, 14148 Riverdowns South Dr., Midlothian, Virginia 23113-3796, ZHENGDONG CHENG[1], Artie McFerrin Department of Chemical Engineering, Texas A&M University, College Station, TX, SAMANTHA M. MARQUEZ, Maggie L. Walker Governor's School for Government and International Studies, Richmond, VA — We present a novel microgel templated Yeastosome® (Yeast-Celloidosome®) based on self-assembly of yeast cells onto liquid-gel interfaces. To organize living cells onto the surface of the gel particles, strong positive charges were first introduced via LbL (layer by layer) polyelectrolyte decoration on monodisperse agarose microgel templates fabricated with a microfluidic flow focusing device. Native yeasts, bearing negative surface charges can then be driven electrostatically to form a monolayer shell around the gel core. Surface coverage/packing density of the yeast biofilm on varying microgel-to-yeast size ratio assemblies is evaluated with optical microscopy. Mechanical properties of the corresponding shells are characterized with buckling or collapse behavior during drying-hydrating cycle. We demonstrate the capability to fabricate narrow size distribution Yeastosome® with a soft hydrogel core. The combination of microfluidic fabrication with cell assembly offers excellent control over inner core properties and could enable further hierarchy bio-structures.

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Date submitted: 18 Jan 2011 Electronic form version 1.4