Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Two step yielding of core-shell microgels: An investigation of "hard" and "soft" cage yielding mechanisms via Rheo-SANS[1] JAVORIS HOLLINGSWORTH, ZHI ZHOU, Institute of Chemistry, Chinese Academy of Sciences, SONG HONG, Beijing University of Chemical Techology, GUANGMIN WEI, HE CHENG, CHARLES HAN, Institute of Chemistry, Chinese Academy of Sciences — The yielding mechanism of hybrid microgels composed of a polystyrene (PS) core and thermosensitive poly(N-isopropylacrylamide) (PNIPAM) shell were studied via small-angle neutron scattering with rheological measurements (rheo-SANS). While the PS core attributes to the hard sphere properties of the microgels, the soft sphere properties are due to their PNIPAM shell; softness increases as a function of temperature and decreases with PNIPAM shell thickness. By varying the core-shell ratio or temperature, a series of particles ranging from near-hard sphere to typical soft microgels were obtained. Generally, the first yielding event occurs when short range interactions (bonds between interconnected or local clusters) are broken, whereas the second yielding event is due to the breaking of long range interactions (nearest-neighbor "cages"). According to the results, near-hard sphere suspensions exhibit single-step yielding; however, suspensions at intermediate core-shell ratios display two-step yielding characteristics.

[1]The financial support from the National Basic Research Program of China (973 Program, 2012CB821500), National Natural Scientific Foundation of China (No. 21174152) and the National Science Foundation (OISE-1159189) is gratefully acknowledged.

Javoris Hollingsworth
Institute of Chemistry, Chinese Academy of Sciences

Date submitted: 15 Nov 2013 Electronic form version 1.4