Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Structural Dynamics of Star-Shaped Weak Polyelectrolytes in Dilute Aqueous Solution CHEN QU, Univ of Notre Dame, Y. ELAINE ZHU, Wayne State University — Weak polyelectrolyte (PE) bearing tunable charges along their backbones show great potential as "smart" polymer materials for diverse applications from drug delivery to energy storage. With the introduction of branched topology, the local counterion distribution in the vicinity to the polyelectrolyte segments becomes highly inhomogeneous. To experimentally investigate the interplay between structural dynamics and local electric environment of a branched polyelectrolyte, in this work we custom synthesized star-shaped poly(2-vinylpyridine) (P2VP) using reversible addition fragmentation chain transfer (RAFT) polymerization and labeled P2VP stars with pH-sensitive fluorophore precisely either in the center or periphery. By employing fluorescence correlation spectroscopy (FCS) with photon counts histogram (PCH) analysis, we observed gradual stretched-to-collapses conformational transition with increasing solution pH for both P2VP stars of different fluorophore labeling locations. However, the measured local pH, or local proton concentration, shows strong dependence of the fluorophore labeling locations. Higher electric potential yet lower ionization degree was observed in the core of P2VP star than that in the periphery. Ongoing work is carried out to examine the scaling behaviors of P2VP star sizes with varied number of arms, arm lengths and counterion concentrations in dilute aqueous solutions.

Chen Qu
Univ of Notre Dame

Date submitted: 02 Dec 2015 Electronic form version 1.4