Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Chain Conformation of Phosphorycholine-based Zwitterionic Polymer Brushes in Aqueous Solutions JUN MAO, Univ of Chicago, JING YU, SUNGSIK LEE, Argonne National Laboratory, GUANGCUI YUAN, SUSHIL SATIJA, National Institute of Standards and Technology, WEI CHEN, Argonne National Laboratory, MATTHEW TIRRELL, Univ of Chicago — Polyzwitterionic brushes are resistant to nonspecific accumulation of proteins and microorganisms, making them excellent candidates for antifouling applications. It is well-known that polyzwitterions exhibit the so-called antipolyelectrolyte effect: Polyzwitterionic brushes would adopt a collapsed conformation at a low ionic strength due to the electrostatic inter/intra-chain association; whereas at a high ionic strength, they would exhibit an extended conformation because the electrostatic inter/intra-chain dipoledipole interaction is weakened. However, poly(2-methacryloyloxyethyl phosphorylcholine) (PMPC) is a unique member in polyzwitterionic families. Its ultra-high affinity to water leads to no detectable shrinks in aqueous solutions even at low ionic strengths. In this study, we synthesized highly dense PMPC brushes via surface initiated radical polymerization and systematically investigate their conformational behaviors at solid-liquid interfaces in the presence of multivalent counterions, combining X-ray and neutron scattering and force measurements. We have demonstrated that despite no obvious changes of the entire lengths of extended PMPC brushes in aqueous solutions, the chain conformations including, but not limited to, polyzwitterion distribution and charge correlation, varied, dependent on salt types, ionic strengths and ion valences.

Jun Mao
Univ of Chicago

Date submitted: 14 Nov 2016 Electronic form version 1.4