Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Resonant Soft X-ray Scattering as a Powerful Probe of Buried Polymer Interfaces[1] WEI CHEN, ZHANG JIANG, Argonne Natl Lab, MATTHEW TIRRELL, The University of Chicago — Elucidation of polymer interfacial structures provides insights into interfacial molecular mechanisms for coating protection, adhesion, lubrication, friction, wettability, biocompatibility, and even charge transport properties. Resonant Soft X-ray Scattering (RSoXS) offers a unique element, site and valence specific probe to study spatial modulations of molecular orbital degrees of freedom on the nanoscopic length scale. This unique sensitivity is achieved by merging small angle x-ray scattering and x-ray absorption spectroscopy into a single experiment, where the scattering provides information about spatial modulations and the spectroscopy provides sensitivity to the molecular anisotropy. Here we applied RSoXS to polystyrene (PS) films at solid-solid interfaces and poly(2-methacryloyloxyethyl phosphorylcholine) (PMPC) brushes at solid-liquid interfaces. It is found that the interfacial width of PS thin film is about one order of magnitude large than those observed by traditional scattering techniques. In addition, although the ion-induced changes of PMPC thickness are not apparent in aqueous solutions, their chain conformations like polyzwitterion distribution and correlation varied, dependent on salt types, ionic strengths and ion valences. Consequently, it is evident that RSoXS is a powerful probe of buried polymer interlaces with both spatial and chemical sensitivities.

[1]This work was supported by the U.S. Department of Energy, Office of Science, Program in Basic Energy Sciences, Division of Materials Science and Engineering.

Wei Chen
Argonne Natl Lab

Date submitted: 11 Nov 2016 Electronic form version 1.4