Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

States of Salt Water in Polyampholyte Hydrogel Networks at Ice Forming Temperatures HYUN-JOONG CHUNG, XINDA LI, JANET A.W. ELLIOTT, Univ of Alberta — The behavior of water in polymers, including ice formation, is of increasing interest. For example, one can achieve improved longevity of water-borne polymeric coatings and aqueous electrolytes that operate at low temperature by understanding the polymer-water interaction. Water molecules that are bound to hydrophilic polymer backbones are known to be non-freezable at extremely low temperatures such as -100C, whereas non-bound water is still freezable at higher temperatures. Polyampholyte, which contains both cationic and anionic groups in its backbone, is an interesting class of anti-fouling coating material with a hygroscopic nature and self-healing ability. In real operational condition, for example in maritime petroleum production in the arctic climate, multiple species of salt ions can complicate the ice formation, but their effect has not been exhaustively studied. Using a random copolymer of sodium p-styrenesulphonate (NaSS) and 3-(methacryloylamino)propyl-trimethylammonium chloride as a model system to study the phase behavior of NaCl salt in the hydrogel, this work presents (i) intriguing mechanical and electrical properties of polyelectrolytes at low temperature (<-20C), (ii) differential scanning calorimetry studies on the effects of salt concentration, polymer chain density, degree of polymerization, and (iii) effect of dialysis on microstructure and phase water behavior in the polyampholyte hydrogel.

Hyun-Joong Chung
Univ of Alberta

Date submitted: 06 Nov 2015 Electronic form version 1.4