ABSTRACT: Electrostatic interaction in structured fluid is sensitive to a variety of short-ranged features including molecular polarity and dielectric heterogeneity. Through a joint theoretical and experimental effort, we show that charge connectivity, backbone polarity, and mixing stoichiometry all markedly impact the demixing instability of polyelectrolyte solutions. In particular, stoichiometry asymmetry leads to a looping-in complexation window, in which adding salts causes the polymers to salt out, contrary to the salting-in behavior commonly observed. Aided with dual-fluorescent labeling and elemental mapping, we unambiguously measured the concentrations of four ionic species in both coexisting phases and rationalized the looping-in behavior by considering the competition of ion entropy and strength of electrostatic screening.

Professor Qin received B.S. and M.S. in materials science from Tsinghua University, and Ph.D. from the department of Chemical Engineering and Materials Science at University of Minnesota. Following postdoc trainings at Pennsylvania State University and University of Chicago, he joined the faculty in Chemical Engineering at Stanford University in 2016. His research focuses on theoretical modeling of morphological and rheological behaviors of polymeric fluids, electrostatic interactions in structured electrolytes, and surface charge polarizations.