

# Determining the Regimes of Dielectric Mismatch and Ionic Correlation Effects in Ionomer Blends

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We examine the effects of ionic correlations and dielectric mismatch on the miscibility of ionomer blends with a hybrid ionomer blend thermodynamic liquid state theory approach. The ionomer (A) has a dielectric constant  $\epsilon_A$  and low charge fraction (<10%). First, explicit ions coarse-grained molecular dynamics simulations with no dielectric mismatch verify that ionic correlations lead to segregation, in agreement with the theory, which includes nonlinear and many-body effects. Then, the extended theory that incorporates dielectric mismatch shows that strong ionic correlations dominate the phase behavior when the dielectric mismatch is low. However, solvation effects dominate when the mismatch is high ( $\epsilon_A \gg \epsilon_B$ ), where the preference of the ions to be solvated in a higher dielectric medium is balanced by the entropic driving force for a uniform dielectric constant throughout the system. When salt is added as a third component, dielectric mismatch is significant only at low salt concentrations.

