Incorporation of a Cationic Conjugated Polyelectrolyte CPE within an Aqueous Poly(vinyl alcohol) Sol

We report on a multiscale polymer-within-polymer structure of the cationic conjugated polyelectrolyte poly[9,9-bis(6-N,N,N-trimethylammonium)hexyl]fluorene phenylene] (HTMAPFP) in aqueous poly(vinyl alcohol) (PVA) sol. Molecular dynamics simulations and small-angle neutron scattering (SANS) data show that HTMA-PFP forms aggregates in water but becomes entangled by PVA (with a 1:1 molar ratio of HTMA-PFP to PVA) and eventually immersed in PVA clusters (with the ratio 1:4). This is attributed to the hydrophobic hydrophilic balance. Contrast variation data with regular and deuterated PVA support a rigid body model, where HTMA-PFP is confined as locally isolated, but closely located, chains within PVA clusters, which alter correlation distances within the system. These results are supported by enhanced photoluminescence (PL) and ionic conductivity which, together with a red-shift in UV/vis absorption spectra, indicate the breakup of HTMA-PFP aggregates upon PVA addition.

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