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Nanostructured anion conducting block copolymer electrolyte thin films[1] CHRISTOPHER ARGES, YU KAMBE, PAUL NEALEY, University of Chicago/Argonne National Laboratory — Lamellae forming block copolymer electrolyte (BCE) thin-films with perpendicular aligned orientation were registered with high fidelity over large areas via a self-assembly process followed by a novel chemical vapor infiltration reaction (CVIR) technique. In this scheme, poly(styrene-*b*-2-vinyl pyridine) (PS*b*P2VP) block copolymers were self-assembled with perpendicular orientations on neutral chemical brushes using solvent vapor annealing. The ionic groups were selectively introduced into the P2VP block via a Menshutkin reaction that converted the nitrogen in the pyridine to n-methylpyridinium - anion carrier groups. FTIR-ATR and XPS tools confirmed the formation of the aforementioned ionic moieties post CVIR process and structure imaging tools (e.g., SEM and AFM imaging, GI-SAXS and RSOXs) established that incorporation of the ionic groups did not alter the self-assembled nanostructured films nor did subsequent ion-exchange processes. Electrochemical impedance spectroscopy determined the in-plane ion conductivity of different counteranions in the BCE thin films and alteration to the symmetry of the block copolymer film substantially improved (or hindered) BCE ion conductivity if the P2VP block's volume fraction was slightly greater than (or less than) 0.5.

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