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Constructing ion conducting, nanostructured block copolymer electrolytes through block copolymer self-assembly and block copolymer lithography[1] CHRISTOPHER ARGES, Louisiana State University, YU KAMBE, MOSHE DOLEJSI, University of Chicago/Argonne National Laboratory, GUANGPENG WU, Zhejiang University, PAUL NEALEY, University of Chicago/Argonne National Laboratory — The tools of directed self-assembly and block copolymer lithography realized a series of nanostructured anion and cation conducting polymer electrolyte films with different molecular architectures (e.g., ionic domain connectivity and tortuosity). Key results emphasize that ionic domains with poor alignment and terminal defects have a catastrophic effect on ionic conductivity - a key transport property in ion-exchange membranes for electrochemical applications. Conversely, ensuring complete ionic domain connectivity (i.e., elimination of terminal defect sites at the molecular level) and a tortuosity of one substantially improved ionic conductivity values (almost 100x fold). Controlling the architecture of aggregated ionic domains at the molecular level played a prominent role in the bulk ionic conductivity properties of polymer electrolyte materials.

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