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High Efficiency Conduction at High Ion Contents in Ionomeric Electrolytes KERAN LU, JANNA MARANAS, SCOTT MILNER, Pennsylvania State Univ — High conductivity solid polymer electrolytes (SPEs) can open the door to safer batteries with greater capacity. Current SPEs have low conductivity, which in part is due to collective motion losses from ions diffusing as clusters. Charge is "carried" by neutral ion clusters (i.e. pairs). Using an ion-only coarse-grained molecular dynamics simulation, we show that a high ion content ionomeric electrolyte shows negligible collective motion losses due to the passing nature of ion transport. Compared to carrying, passing randomizes cation-anion motion beyond their coordination distance, resulting in greater conduction efficiency in agreement with experiments. These results suggest that well designed ion networks at higher ion contents could potentially produce highly-conductive SPEs.

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