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Tailoring ion transport to improve thermoelectric properties of mixed polymer thermoelectrics SHUBHADITYA MAJUMDAR, GABRIEL E. SANOJA, NICOLE MICHENFELDER-SCHAUSER, COLIN R. BRIDGES, RACHEL A. SEGALMAN, University of California, Santa Barbara — Polymer thermoelectrics show potential for simultaneously possessing high Seebeck coefficients and electrical conductivities by coupling electrochemical reactions at the electrodes with independent pathways for ion and electron transport. We show that by blending commercially-available PEDOT:PSS with a metal–polymer complex, the thermal diffusion of ions due to the Soret effect and the entropy of the electrochemical reactions can be leveraged to obtain Seebeck coefficients of O(10 mV/K). The transient behavior of the Seebeck coefficient in these systems can be systematically modified based on the nature of the ionic species. We describe the chemistry necessary to realize these phenomena in dry and ambient conditions and suggest future pathways to further optimize the figure of merit. These findings are an improvement over previous studies wherein such effects were demonstrated only in high-humidity environments, thus allowing us to perform detailed experimental analysis of the energy transport phenomena in such polymer thermoelectrics.

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