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Lithium Metal Batteries Using Cross-linked Polymer Electrolytes: Importance of the Electrode/Polymer Electrolyte Interefaces QIWEI PAN, DMITRI BARBASH, CHRISTOPHER LI, Drexel University — Lithium metal batteries (LMBs) are of high demand these days, since they show ten times higher of capacity when compared to the currently used graphite anode in the lithium ion batteries. However, the uneven deposition of lithium on the lithium metal which leads to growth of lithium dendrites that can short-circuit the cell is still a big problem for this technology. Nowadays, the all solid-state polymer electrolytes (SPEs) show their potential use in the LMBs due to their excellent lithium dendrite growth resistance and superior safety. In this work, a serious of cross-linked SPEs with different network structures are used in the LMBs with a $LiFePO_4$ cathode. High performance LMBs with excellent rate capability and long cycle life can be obtained at 90 C. Furthermore, electrochemical impedance spectroscopy (EIS), scanning electron microscopy (SEM), and X-Ray photoelectron spectroscopy (XPS) were firstly introduced to study these LMBs. For the first time, it is found that the interfaces of the cathode|SPE and Li|SPE play important roles in the stability of the polymer LMBs. It is also found that these interfaces are stable to temperature. The obtained LMBs show high performance at the medium temperature range.

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