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Measuring Lithium Dendritic Growth in Polymer Electrolytes YUPING HE, State University of New York, Binghamton, GREGORY DOWNING, National Institute of Standards and Technology, HOWARD WANG, Univ of Maryland-College Park — The nature of Li dendritic growth in polymeric electrolytes for rechargeable batteries has been investigated using simultaneous electrochemical and neutron depth profiling (NDP) measurements. A symmetric sandwich cell of Li / poly(ethyleneoxide) (PEO) : lithium bis(trifluoromethane)sulfonamide (LiTFSI) / Li was used as a model system in this study. Operating the cell at a constant electric current of 0.1 mA, in situ NDP measurements show that after a period of steady Li plating, dendrites start to grow, which eventually short-circuit the sandwich cell. 3D Li mapping reveals heterogeneous lateral distribution of Li over length scales from below a millimeter to centimeters. Most Li in the electrolyte layer resides in dendrites growing from the top electrode, it is observed that dendrites also grow from the bottom electrode, where presumably only Li oxidation reaction occurs. The revelation poses new design and engineering challenges in using Li metal electrode in future development of rechargeable batteries.

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