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Characterization of Ion Movement in Light-Emitting Electrochemical Cells via ToF-SIMS TYKO SHOJI, Department of Physics and Astronomy, Western Washington University, Bellingham, WA, USA, ZIHUA ZHU, Environmental Molecular Sciences Laboratory, Pacific Northwest National Laboratory, Richland, WA, USA, ANTON ILKEVICH, Department of Chemistry, Western Washington University, Bellingham, WA, USA, JANELLE LEGER, Department of Physics and Astronomy, Western Washington University, Bellingham, WA, United States — An emerging advantage of organic semiconductors is their ability to conduct ions in applications such as light-emitting electrochemical cells (LECs), photovoltaic devices, and electrochromic devices. This ability of organic materials to conduct both ionic and electronic currents in the solid state sets these materials apart from their inorganic counterparts. However the fundamental electrochemical processes are not well characterized. Evidence suggests that the profiles of ions and electrochemical doping in the polymer film during operation significantly impact the performance and stability of the device. Here, we present our findings from direct profiling of ion distributions in LECs following application of voltage, via time-of-flight secondary ion mass spectrometry. Ion distributions were characterized with regard to film thickness, salt concentration, applied voltage, and relaxation over time. Results provide insight into correlation between ion profiles and device performance and potential approaches to tuning electrochemical doping processes in LECs.

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