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Role of Ionic Functional Groups on Ion Transport at Perovskite Interfaces YAO LIU, PSE UMASS Amherst, LAWRENCE RENNA, HILARY THOMPSON, Chemistry Department, UMASS Amherst, ZACHARIAH PAGE, TODD EMRICK, PSE UMASS Amherst, MICHAEL BARNES, Chemistry Department, UMASS Amherst, MONOJIT BAG, Physics Department, Indian Institute of Technology, D. VENKATARAMAN, Chemistry Department, UMASS Amherst, THOMAS RUSSELL, PSE UMASS Amherst — Hybrid organic/inorganic perovskite solar cells have invigorated the photovoltaic community with their remarkable properties. However, many perovskite solar cells show an undesirable current-voltage ($I-V$) hysteresis in their forward and reverse voltage scans, to the detriment of device characterization and performance. This hysteresis is likely due to slow ion migration in the bulk of the perovskite active layer. We show the interfacial chemistry between the perovskite and charge transport layer plays a critical role in the ion transport and subsequent $I-V$ hysteresis in perovskite based devices. Three phenylene vinylene polymers containing cationic, zwitterionic, and anionic pendent groups were utilized to fabricate charge transport layers with diverse interfacial ionic functionalities. The interfacial-adsorbing boundary induced by the polymer zwitterion at the interface traps mobile ions, responsible for the $I-V$ hysteresis in these perovskite-based devices. Further, we exploit the ion adsorbing nature of the interface to fabricate perovskite-based memristors. Here, we examine a new chemical mechanism fundamental to $I-V$ hysteresis in perovskite-based devices and introduces a novel paradigm of interfacial ion adsorption to induce memristive behavior.

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