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Photovoltaic Response of an Adaptive Mix-conducting *p*-*n* Junction FUDING LIN, ETHAN WALKER, MARK LONERGAN, Department of Chemistry, University of Oregon — Most photovoltaic junctions are based on materials that contain only electronic charge carriers, and they rely on a built-in electronic asymmetry to separate photo-generated carriers. In this work we study the photovoltaic response and the photo-induced NIR absorption of a mix-conducting *p*-*n* junction constructed from two polyacetylene ionomers with symmetric Au electrodes. The two ionomers share the same semiconducting backbone but are dissimilarly functionalized so that all anions are fixed in the anionic ionomer, and all cations are fixed in the cationic ionomer. Based on our experimental observations, we propose that the response of the junction can be explained by an adaptive photochemical doping process enabled by the built-in ionic asymmetry. According to this model, the simultaneous equilibration of ionic and electronic charge carriers across the junction upon contact leads to spontaneous *p*-doping of the anionic ionomer and *n*-doping of the cationic ionomer in the dark. When the junction is illuminated, the doping levels of both ionomers change adaptively with light intensity as a result of interaction between ionic and electronic carriers. This adaptive photochemical doping process is a unique property of mix-conducting junctions with built-in ionic asymmetry.

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