Interface analysis in ionovoltaics

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Ion-solid surface interactions are one of the fundamental principles in liquid-interfacing devices ranging from various electrochemical systems to electrolyte-driven energy conversion devices. The interplays are worked as a pivotal role in the operation of these devices, but corresponding details of those effects remained as unrevealed issues in academic fields. Herein, an ion-charge carrier interaction at an electrolyte-semiconductor interface was interrogated with an ion-dynamics-induced (ionovoltaic) energy transducer, controlled by interfacial self-assembled molecules. An electricity generating mechanism from interfacial ionic diffusion was originated from a dipole potential effect of the self-assembled molecular layer. With aiding of surface analytic techniques and a liquid-interfacing Hall measurement, electrical behaviors depending on the magnitude of the ion-ligand complexation were interrogated, thereby demonstrating the ion-charge carrier interplays spanning at interface. Hence, this system could be applicable to studying molecular interactions, including both chemical and physical influences, occurring at the solid-liquid interfacial region.