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Gated Seebeck Using Polymerized Ionic Liquid Gate Dielectrics ELAYNE THOMAS, BHOOSHAN POPERE, HAIYU FANG, MICHAEL CHABINYC, RACHEL SEGALMAN, Univ of California - Santa Barbara — Thermoelectric materials have the ability to convert a temperature gradient into usable electrical power via the Seebeck effect. This phenomenon is directly related to the material's Seebeck coefficient and electrical conductivity, which are in turn linked to its electron (or hole) mobility and carrier concentration. Organic semiconductors show promise for thermoelectric applications due to their flexibility and low-temperature manufacturing techniques; however, the role of ionized dopants on charge transport in these materials remains poorly understood. In this work, we use polymerized ionic liquids (PILs) as a gate dielectric in organic field-effect transistors to directly control the concentration of charges in the conducting channel. We report a method to tune the carrier concentration in the transistor channel via electrostatic gate modulation. We observe carrier concentration levels that are comparable to traditional doping methods with the added ability to precisely tune the concentration of charges induced. With this process, we aim to gather new information on the effect of ions on the performance of organic semiconductors in hopes of better understanding charge transport in conducting polymers on a molecular level.

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