

Uniaxial Alignment and Ion Exchange Doping to Enhance the Thermoelectric Properties of Organic Polymers

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Abstract : This project delves into the efficiency of uniaxial alignment and ion exchange doping as methods to optimize the thermoelectric properties of organic polymers. The anisotropic nature of charge transport in conjugated polymers is capitalized upon through the uniaxial alignment of polymer backbones, ensuring charge transport is streamlined along these backbones. Ion exchange doping has demonstrated superiority over traditional molecular and electrochemical doping methods, amplifying charge carrier densities. By integrating these two techniques, we've observed marked improvements in the thermoelectric attributes of specific conjugated polymers such as PBTTT and DPP based polymers. We demonstrate respectable power factors of $172.6 \mu\text{W m}^{-1} \text{K}^{-2}$ in PBTTT system and $41.7 \mu\text{W m}^{-1} \text{K}^{-2}$ in DPP system.

Keywords : organic electronics, thermoelectrics, uniaxial alignment, ion exchange doping

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