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The Influence of Backbone Correlation Length and Dopant Strength on the Thermoelectric Power Factor of Semiconducting Polymers SHRAYESH PATEL, University of Chicago - Institute for Molecular Engineering, ANNE GLAUDELL, EUNHEE LIM, MICHAEL CHABINYC, UC Santa Barbara - Materials — The performance of doped semiconducting polymers is strongly governed by processing methods and underlying thin-film microstructure. We report on the influence of different doping methods (solution vs vapor) on the thermoelectric power factor (PF) of PBTTT molecularly doped with F_nTCNQ ($n = 2$ or 4). The vapor doped films have over two-orders of magnitude higher electronic conductivity (σ) relative to solution-doped films. On the basis of resonant soft x-ray scattering, vapor-doped samples are shown to have a large orientational correlation length (OCL) (*e.g.*length-scale of aligned backbones) that correlate to a high apparent charge carrier mobility (μ). Interestingly, the Seebeck coefficient (α) is largely independent of OCL. This reveals that, unlike electronic conductivity, leveraging strategies to improve μ does not have a dramatic impact on α. Overall, our work introduces important general processing guidelines for the continued development of doped semiconducting polymers for thermoelectrics.

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