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Understanding morphology-property relationship in chemically doped P3HT EUNHEE LIM, KELLY PETERSON, MICHAEL CHABINYC, Univ of California - Santa Barbara — Enhancing the electrical conductivity of semiconducting polymers is crucial for high performance organic electronic applications. Chemical doping with dopant molecules can increase the electrical conductivity by increasing charge carrier density through charge transfer between the polymer chain and the dopants. As charge transfer is closely related to the film morphology, studying the impact of doping on morphology is important for finding an efficient doping method. In this work, we studied the morphology-performance relationship in P3HT thin films doped with F4TCNQ by comparing vapor doped and solution doped films using a combination of X-ray scattering and electrical characterization. The maximum electrical conductivity was similar for both doping methods. However, grazing incidence wide-angle scattering showed that vapor doping gives a larger number of heavily doped regions compared to solution doping. Resonant soft x-ray scattering showed that vapor- and solution- doping have similar long-range connectivity between the crystalline regions explaining the similarity in conductivity in the films. This work allows us to better understand morphological influences on chemical doping methods, which opens up new possibilities of exploring efficient doping methods.

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