Acido-basic control of the thermoelectric properties of poly(3,4-ethylenedioxythiophene)tosylate (PEDOT-Tos) thin films

PEDOT-Tos is one of the conducting polymers that displays the most promising thermoelectric properties. Until now, it has been utterly difficult to control all the synthesis parameters and the morphology governing the thermoelectric properties. To improve our understanding of this material, we study the variation in the thermoelectric properties by a simple acido-basic treatment. The emphasis of this study is to elucidate the chemical changes induced by acid (HCl) or base (NaOH) treatment in PEDOT-Tos thin films using various spectroscopic and structural techniques. We could identify changes in the nanoscale morphology due to anion exchange between tosylate and Cl- or OH-. But, we identified that changing the pH leads to a tuning of the oxidation level of the polymer, which can explain the changes in thermoelectric properties. Hence, a simple acid-base treatment allows finding the optimum for the power factor in PEDOT-Tos thin films.

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