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Correlation between dimensional crossover and thermoelectric performance in conducting polymer JUNHYEON JO, IN-SEON OH, MI-JIN JIN, JUNG-WOO YOO, Ulsan National Institute of Science and Technology (UNIST) — Conjugated polymers are emerging as attractive thermoelectric materials, resulting from low thermal conductivity, easy process and variable potentials for change. Recently, there are significant improvements of the Seebeck coefficient (S) and electric conductivity (σ) in the conjugated polymers by adding chemical additives to reform its ordinary disordered structure system. However, the relation between thermoelectricity and charge transport in the system is not well understood, which gives us a new challenge to improve thermoelectricity in the organic system. Here, we studied thermoelectric performance of dimethyl sulfoxide (DMSO) doped poly(3,4-ethylenedioxythiophene)-poly(styrenesulfonate) (PEDOT:PSS) with adding variable amounts of fluorosurfactant Zonyl. The charge transport in this disordered system was analyzed within variable range hopping (VRH), which showed the change of hopping dimensionality with further molecular dopants. The morphological change and its effect on charge transport and thermoelectric performance were further investigated through AFM, XPS, etc. As a result, we found the optimal condition for increasing both the Seebeck coefficient and electric conductivity, resulting in a significant improvement for the power factor ($S^2\sigma$).

Junhyeon Jo
Ulsan National Institute of Science and Technology (UNIST)

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