Optimization of thermoelectric properties of conducting polymer/inorganic nanoparticles hybrid films

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Inorganic materials including Bi_2Te_3 and PbTe are conventionally utilized in thermoelectric generators that convert a temperature gradient into an electrical potential. Despite their high conversion efficiency, crucial drawbacks such as high cost, low processability, and high thermal conductivity make their applications difficult. In the present work, nanostructured inorganic materials were prepared by the simple top-down method and blended with conducting polymer solution to form organic/inorganic thermoelectric nanohybrids. The resulted composites possessed the great film processability and enhanced thermoelectric properties. The thermoelectric properties were optimized by controlling the content of inorganic materials. The mechanisms of the enhancement were analyzed by energy-dependent scattering model.