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# HIGHLY CONDUCTING POLYMERS FOR THERMOELECTRIC APPLICATIONS

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**Thermoelectric materials could be applied as thermal power generators to convert heat directly into electrical energy or as a solid state Peltier cooler. In general, traditional thermoelectric materials include alloy such as $Bi_2Te_3$, $Sb_2Te_3$ PbTe, etc. Recently, conducting polymer-based semiconductors have been gradually receiving much attention as conducting polymers are able to offer many advantages such as low cost, lightweight, flexibility and solution-process fabrication. In addition, conducting polymeric materials with intrinsically low thermal conductivity, which is over two to three orders of magnitude lower than that of commercial inorganic materials, make them as potential candidates for high performance thermoelectric applications. However, the efficiency of conducting polymeric materials is still much lower than that of inorganic counterparts such as $Bi_2Te_3$ and $Sb_2Te_3$. The thermoelectric performance of a material is usually judged by a dimensionless thermoelectric figure of merit (ZT), which is calculated in terms of $ZT = S^2\sigma T/\kappa$, where S, σ, T and κ are the Seebeck coefficient, electrical conductivity, absolute temperature and thermal conductivity, respectively. As the thermal conductivity of conducting polymers is usually less than 1 W/mK, much work is focused on how to enhance the electrical conductivity and Seebeck coefficient or how to obtain a proper balance between electrical conductivity and Seebeck coefficient so as to achieve thermoelectric materials with a high ZT value. This presentation will highlight recent advances of highly conductive polymers including poly(3,4-ethylenedioxythiophene) and related analogous polymers for thermoelectric applications.**

## Biography

Jianwei Xu is currently a Principal Scientist, Strategic Research Councillor at the Institute of Materials Research and Engineering (IMRE), Agency for Science, Technology and Research (A*STAR), and he is an Adjunct Research Associate Professor in the Department of Chemistry at the National University of Singapore (NUS). He is also Program Manager of the Hybrid Thermoelectric Program of Science and Engineering Research Council (SERC), A*STAR. His research interests include: functional π molecular and conjugated polymer materials for electrochromic and thermoelectric applications, organic-inorganic hybrid materials and aggregation-induced emission (AIE)-active materials.

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