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Polymer Thermoelectric Generators: Device Considerations SHANNON YEE, Georgia Institute of Technology — Recent control of the transport properties in polymers has encouraged the development of polymer thermoelectric (TE) devices. Polymer TEs are thought to be less expensive and more scalable than their inorganic counterparts. The cost of the raw material is less and polymer TEs can leverage the large areal manufacturing technique established by the plastics industry. Additionally, while the overall ZT of polymer TEs appears attractive, individual polymer properties have a very different scale than their inorganic counterparts (i.e., the thermal conductivity and electrical conductivity are approximately one and two orders of magnitude smaller, respectively). Furthermore, the majority of TE measurements on polymers have been limited to thin-films where traditional TE materials are measured in bulk. So why should it be expected that polymer TE devices resemble traditional TE devices? Given the uniqueness of polymers, different device architectures are proposed that can leverage the unique strengths of polymer films. It will be shown that by logically considering device requirements, new polymer TE devices have non-linear features that are more attractive than linear inorganic TE devices. This leads to very different device optimizations that favor polymer TEs.

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