Abstract Submitted
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Improved Thermoelectric Performance via Piezoelectric Interaction DAVID MONTGOMERY, Wake Forest University — Presented are the initial findings of enhanced voltage output in a hybrid thermoelectric piezoelectric generator (TPEG). We constructed TPEG by integrating insulating layers of polyvinylidene fluoride (PVDF) piezoelectric films between flexible thin film p-type and n-type thermoelectrics. The piezoelectric bound surface charge modifies the thermoelectric properties of the semiconductor electrodes which facilitates an increase in voltage. The TPEG voltage output has three contributions: traditional thermoelectric and piezoelectric terms, and a unique coupling term. A combined thermoelectric and piezoelectric model can be used to quantify the expected coupling voltage as a function of stress and thermal gradient. The fabrication, placement, and configuration of this interface allows for different device designs and affects overall performance. Under easily achievable stress and thermal gradient this new coupling effect can increase voltage output by 20%. Because of this piezoelectric modified thermoelectric effect these hybrid generators can out preform equivalent thermoelectric or piezoelectric generators.

David Montgomery
Wake Forest University

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