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Silver Nafion for Thermogalvanic Applications WILLIAM CHANG, BHOOSHAN POPERE, University of California, Berkeley, CHRIS EVANS, University of California, Santa Barbara, BORIS RUSS, University of California, Berkeley, RACHEL SEGALMAN, University of California, Santa Barbara — Thermogalvanics convert a temperature gradient, typically from waste heat, into electrical power using a reversible electrochemical reaction. The conversion efficiency in thermogalvanics, like with thermoelectrics, are governed by the Seebeck coefficient, the carrier conductivity and the thermal conductivity of the material. We demonstrate that the material systems silver Nafion and silver poly-styrenesulfonate are air-stable, water processable materials that demonstrate extremely high Seebeck coefficients and moderate carrier conductivities. These power factors, when coupled with the low thermal conductivities inherent in polymers, results in materials with excellent thermogalvanic figure of merits. We show the dependence of these three material properties to material composition and processing. In this talk, we show how the Seebeck coefficient in silver Nafion and silver polystyrene-sulfonate are opposite in sign, allowing construction of a thermogalvanic device. With these ion conductors, we hope to open up a flexible pathway to waste heat recovery using materials typically studied for electrochemical applications.

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