Abstract Submitted
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Study on Transport and Mechanical Properties of La and Ce Double Filled p-type Skutterudites[1] TULASHI DAHAL, Department of Physics and TCSUH, University of Houston, TX 77204, SONIKA GAHALWAT, Department of Mechanical Engineering, University of Houston, TX 77204, QING JIE, HEE SEOK KIM, KESHAB DAHAL, WEISHU LIU, Department of Physics and TCSUH, University of Houston, TX 77204, YUCHENG LAN, Department of Physics, Morgan State University, MD 21251, KENNETH WHITE, Department of Mechanical Engineering, University of Houston, TX 77204, ZHIFENG REN, Department of Physics and TCSUH, University of Houston, TX 77204, REN'S GROUP TEAM — Optimizing the thermoelectric performance of p-type skutterudites is extremely challenging due to several factors such as low Seebeck voltage and bipolar contribution in electrical and thermal conductivity at elevated temperature, leading to small ZT value. In this work, we report improved thermoelectric performance of La and Ce double filled p-type skutterudites by melting-quenching-annealing-ball milling-hot pressing. The observed high power factor ($\sim$35 μW cm^{-1} K^{-2} at 500 °C) and low thermal conductivity ($\sim$2.5 W m^{-1} K^{-1} at 500 °C) leads to a peak ZT about 1.1 in the optimized composition. With a ΔT of 475 °C between heat source and sink, the estimated output power density in the best sample is $\sim$8 W cm^{-2}. The nano-indentation experiment reveals that the hardness and Young's modulus of elasticity of the sample is much better than Bi_2Te_3 and PbTe-based samples, indicating skutterudites is suitable for practical applications where mechanical strength is also important.

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