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Thermoelectric properties of filling-controlled zinc-antimonides with layer structure T. SUZUKI, M.S. BAHRAMY, CMRG and CERG, RIKEN ASI, Japan, R. ARITA, Dept.of Appl. Phys., Univ.of Tokyo, CMRG and CERG, RIKEN ASI, Japan, Y. TAGUCHI, CMRG and CERG, RIKEN ASI, Japan, Y. TOKURA, Dept.of Appl. Phys., Univ.of Tokyo, CMRG and CERG, RIKEN ASI, ERATO MF, JST, Japan — Thermoelectric properties have been investigated for polycrystalline samples of layer-structured $R_{1-x}A_x$ZnSbO (R=La, Ce; A=Ca, Sr) as two-dimensional analogues of a conventional thermoelectric semiconductor ZnSb[1]. By substituting A^{2+} for R^{3+} in the charge-reservoir layers, carrier concentration can be successfully controlled without lowering the carrier mobility. The hole doped materials showed low thermal conductivity and moderately high thermopower, whose temperature- and doping-dependence were well explained by theoretical calculation. The values of dimensionless figure of merit ZT were found to increase without showing any sign of saturation up to 390 K, and even higher values can be expected along the conducting ZnSb layers for a single crystal. These results indicate the potential of the hole-doped RZnSbO as a good thermoelectric material. This work was in part supported by FIRST program on "Quantum Science on Strong Correlation" from JSPS.

[1] T. Suzuki, M. S. Bahramy, R. Arita, Y. Taguchi, and Y. Tokura, Phys. Rev. B 83, 035204 (2011)

Y. Taguchi
CMRG and CERG, RIKEN ASI, Japan

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