

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Enhancement of thermoelectric figure-of-merit in a wide temperature range in $\text{In}_4\text{Se}_{3-x}\text{Cl}_y$ bulk crystals JONG-SOO RHYEE, Kyung Hee University, KYUNGHAN AHN, KYU HYOUNG LEE, Samsung Advanced Institute of Technology, JI HOON SHIM, Pohang University of Science and Technology, JAE HOON KIM, Yonsei University, KYUNG HEE UNIVERSITY TEAM, SAMSUNG ADVANCED INSTITUTE OF TECHNOLOGY COLLABORATION, POHANG UNIVERSITY OF SCIENCE AND TECHNOLOGY COLLABORATION, YONSEI UNIVERSITY COLLABORATION — Recently, we proposed that the charge density wave is a new pathway for high thermoelectric performance in bulk crystalline materials [1,2]. Through the quasi one-dimensional lattice distortion (Peierls distortion) in $\text{In}_4\text{Se}_{3-x}$ bulk single crystals, we have achieved a high thermoelectric figure-of-merit ZT of 1.48 at 705 K. From the Boltzman transport calculation, it was confirmed that the reported ZT could be further increased if we could increase the chemical potential of the $\text{In}_4\text{Se}_{3-x}$ crystals. Here we report the significant increase of ZT over a wide temperature range from 50 °C to 425 °C by chlorine doping in the $\text{In}_4\text{Se}_{3-x}$, which comes from the improvement of crystal quality and increase of chemical potential, resulting in the power factor enhancement and the thermal conductivity reduction.

[1] J.-S. Rhyee et al., J. Appl. Phys. **105**, 053712 (2009).

[2] Jong-Soo Rhyee et al., Nature (London) **459**, 965 (2009).

Jong-Soo Rhyee
Kyung Hee University

Date submitted: 17 Nov 2010

Electronic form version 1.4