

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Magnon gap formation and charge density wave effect on thermoelectric properties in SmNiC2 compound JIN-HEE KIM, JONG-SOO RHYEE, Department of Applied Physics, Kyung Hee University, YONG SEUNG KWON, Department of Emerging Materials Science, Daegu Gyeongbuk Institute of Science and Technology — We studied the magnetic, electrical, and thermal properties of polycrystalline compound of SmNiC₂. The electrical resistivity and magnetization measurement show the interplay between the charge density wave at $T_{\text{CDW}} = 157$ K and the ferromagnetic ordering of $T_c = 18$ K. Below the ferromagnetic transition temperature, we observed the magnon gap formation of $4.3 \sim 4.4$ meV by $\rho(T)$ and $C_p(T)$ measurements. The charge density wave is attributed to the increase of Seebeck coefficient resulting in the increase of power factor $S^2\sigma$. The thermoelectric figure-of-merit ZT significantly increases due to the increase of power factor at $T_{\text{CDW}} = 157$ K. Here we argue that the competing interaction between electron-phonon and electron-magnon couplings exhibits the unconventional behavior of electrical and thermal properties. This research was supported by Basic Science Research Program (2011-0021335), Nano-Material Technology Development Program (2011-0030147), and Mid-career Research Program (Strategy) (No. 2012R1A2A1A03005174) through the National Research Foundation of Korea (NRF) funded by the Ministry of Education, Science and Technology.

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Date submitted: 25 Nov 2012

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