Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

All-oxide spin Seebeck devices using RuO2 film depending on annealing temperature AKIHIRO KIRIHARA, MASAHIKO ISHIDA, YUMA IWASAKI, HIROKO SOMEYA, NEC Corporation, RYO IGUCHI, KEN-ICHI UCHIDA, EIJI SAITOH, Tohoku University, SHINICHI YOROZU, NEC Corporation — The spin Seebeck effect (SSE) [1] has attracted great attention from both scientific and industrial viewpoints. An SSE-based thermoelectric (TE) device usually has a simple bilayer structure consisting of magnetic-insulator and metallic layers. For converting a SSE-induced spin current into an electric current, Pt has been typically used as the metallic layer because of its large inverse spin-Hall effect (ISHE). In this work, we show an all-oxide SSE device which adopts a conductive Ruthenium oxide (RuO_2) film instead of Pt. It was found that the sign and magnitude of the TE voltage appearing in the RuO_2 film is strongly dependent on the post-annealing temperature T_{an}, and when T_{an} = 500°C, the magnitude becomes larger than that using Pt. The result suggests that the ISHE property in RuO_2 is susceptible to its crystalline or electronic states, and can be optimally controlled via its formation processes. All-oxide SSE devices, having high material stability, will be promising for various useful applications such as heat-flow sensing [2]. [1] K. Uchida, et al., Nature 455, 778 (2008) [2] A. Kirihara, et al., Sci. Rep. 6, 23114 (2016)

Akihiro Kirihara
NEC Corporation

Date submitted: 09 Nov 2016 Electronic form version 1.4