Spin Seebeck and anomalous Nernst effects in TbCo/Cu/YIG devices

○(P)Ahmet Yagmur[1], Pham Van Thach[1], Satoshi Sumi[1], Hiroyuki Awano[1], Kenji Tanabe[1]

(1. Toyota Technological Institute)

E-mail: ayagmur@toyota-ti.ac.jp

Interconversion between spin, heat and charge currents is an essential phenomenon in spintronics, since it enables modifying magnetic properties of materials or generating energy [1, 2]. The rare-earth and transition-metal (RE-TM) alloys have a great interest due to consisting of two magnetic sub-lattices [3]. Moreover, the magnetization of RE-TM alloys can be tuned by the composition and temperature. These features provide RE-TM alloys rich interaction with spin currents. However, thermal-driven spin current properties in RE-TM alloys have not fully been investigated. We have studied the spin Seebeck (SSE) and anomalous Nernst effects (ANE) in TbCo/Cu/$Y_3Fe_5O_{12}$ (YIG)/$Gd_3Ga_5O_{12}$ (GGG) and TbCo/Cu/GGG devices. By applying a temperature gradient along the out-of-plane direction, a transverse voltage was observed which may consist of the SSE and ANE signals. We separated these signals and clearly revealed SSE signals in TbCo alloys. Additionally, we observed that the sign of ANE signal dominated by the magnetization of Co.

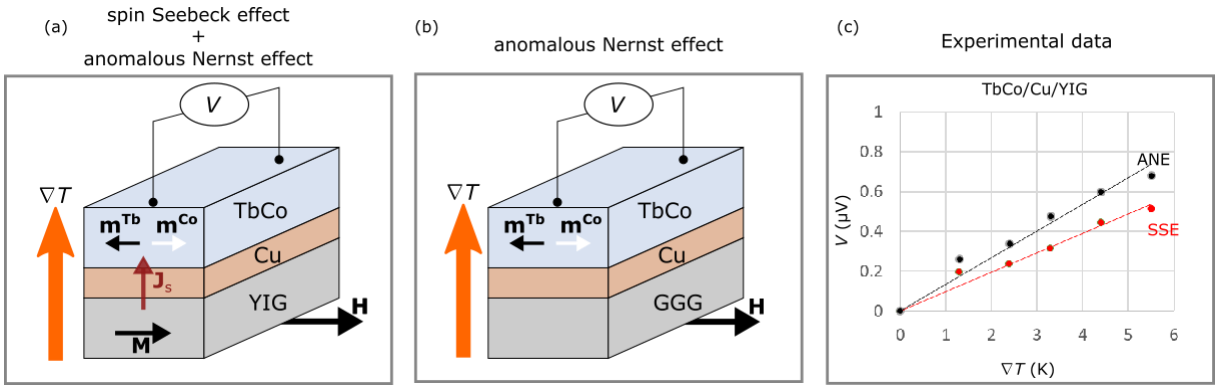

Figure: Schematic illustration of devices and experimental result for the TbCo(25nm)/Cu(3nm)/YIG(30μm)/GGG

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