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Spin Seebeck Effect vs. Anomalous Nernst Effect in Ta/CoFeB /Ta Structures[1] BOWEN YANG, YADONG XU, Univ of California - Riverside, MIKE SCHNEIDER, Everspin Technologies Inc., JING SHI, Univ of California - Riverside, UNIV OF CALIFORNIA - RIVERSIDE TEAM, EVERSPIN TECHNOLOGIES INC. TEAM — We have studied the spin Seebeck effect (SSE) and anomalous Nernst effect (ANE) in a vertical trilayer structure under a vertical temperature gradient. The structure consists of a 3nm CoFeB layer sandwiched by β-phase tantalum (Ta) layers. The samples are deposited by magnetron sputtering. The existence of Ta β-phase is verified by the resistivity and its negative temperature coefficient of resistance(TCR). Under a fixed vertical temperature gradient, the measured transverse thermoelectric voltage is linearly proportional to the total sample resistance when the Ta thickness exceeds 2 nm, which can be explained by a shunting resistor model. When the Ta thickness is below 2 nm, the voltage deviates from the linear resistance dependence and merges to the ANE voltage of the CoFeB single layer, due to a weakened inverse spin Hall effect (ISHE) in Ta thinner than the spin diffusion length. In the linear regime, the slope contains both a varying SSE and a fixed ANE responses, thus the SSE contribution could be quantitatively separated out from the ANE of CoFeB. Our results indicate a large SSE from the β-phase Ta due to its large Spin Hall Angle.

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