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Theory of thermopower in strongly correlated electron systems WATARU KOSHIBAE, Sendai National College of Technology, SADAMICHI MAEKAWA, Institute for Materials Research, Tohoku University — We have studied the effects of spin and orbital degrees of freedom in the strongly correlated electron systems, and have derived the formula of the high-temperature thermopower:

$$Q = -(k_B/e)\ln(g_e/g_h) - (k_B/e)\ln[n_h/(1-n_h)], \quad (1)$$

where n_h is the hole concentration, and g_e (g_h) denotes the local degeneracy of the electronic configuration on the transition metal ion without (with) hole carrier. The local degeneracy is determined by the spin and orbital degrees of freedom. It has been established that the formula (1) gives a good estimation of the thermopower in not only the $3d$ transition metal oxides but also the $4d$ ones, recently. We have studied the thermopower in the oxides composed of several kinds of transition metal ions. Its high-temperature formula shows a complicated expression, however, it is expressed to be the average of the first term of the equation (1) in the case that $n_h = 0.5$, in the double perovskite system. This is because the thermopower is nothing but the entropy carried by the electric current. We will discuss the thermopower of the oxides with several kinds of transition metal ions in the light of the theory.

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