Effect of pressure on thermopower of $EuNi_2Ge_2$

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$EuNi_2Ge_2$ is antiferromagnetic below $T_N \approx 30$ K with an effective moment $\mu_{eff} \sim 7.7\ \mu_B$, indicating the $4f^7$electron configuration (Eu^{2+}) in the ground state. On the other hand, $EuNi_2Si_2$, where Eu is trivalent with the $4f^6$ electron configuration, indicates a temperature independent magnetic susceptibility. It is well known that the application of pressure and replacement Ge by Si have equivalent effects on the valence transition of $EuNi_2Ge_2$. In order to investigate the electronic state of $EuNi_2Ge_2$, we have simultaneously measured thermopower S and electrical resistivity ρ at the temperature range between 1.5 K and 300 K and under pressures up to 3 GPa. In the pressure region of $P \lesssim 2.3$ GPa, ρ increases with increasing temperature, and shows an anomaly in the form of a kink at the Neel temperature T_N. $S(T)$ also reveals a kink at T_N. Both $\rho(T)$ and $S(T)$ indicate a small pressure dependence at the low pressure range. However, $\rho(T)$ and $S(T)$ curves in the low temperature region suddenly changes its feature at $P > 2.3$ GPa, where the magnetic ordering disappears. ρ linearly decreases with decreasing temperature, and shows a sudden drop at the valence transition temperature $T_v \approx 30$ K. $S(T)$ also reveals a drastic increase at T_v, changing its sign from negative to positive around 35 K, and takes maximum at $T \approx 7$ K. The thermal hysteresis was clearly observed in both $\rho(T)$ and $S(T)$ curves around T_v.