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Thermoelectric Properties of Metallic Hexaborides RB_6 ($R = \text{La, Pr, Nd, Gd}$)

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Seebeck coefficient has been studied on the single crystals of metallic hexaborides RB_6 ($R = \text{La, Pr, Nd, Gd}$) at temperatures of 2–300 K. The experiment has shown that the signal is limited by the values $|S| \leq 1.5 \mu\text{V/K}$ for all tested materials. The data obtained for the systems LaB_6 and GdB_6 were approximated by phonon drag contribution caused by quasi-local (Einstein) mode with characteristic temperatures $\Theta_E(\text{LaB}_6) \approx 240 \text{ K}$ and $\Theta_E(\text{GdB}_6) \approx 180 \text{ K}$. On the contrary, the crystal-line electric field effect induces the inversion between negative and positive types of thermoelectricity, which complicates the simulation of phonon drag in the case of PrB_6 and NdB_6 .

Keywords: Seebeck effect, phonon drag, hexaborides, metals.