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Driving thermoelectricity by doping in $CePd_3$

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Intermediate valent $CePd_3$ exhibits one of the highest Seebeck coefficients (about 120 μV/K at a broad maximum around 150 K) within Ce based intermetallics. Such strongly enhanced $S(T)$ values are referred to an intense Kondo interaction responsible for a characteristic temperature T_K of about 240 K. By introducing boron into $CePd_3$ the lattice constant increases and Ce is tuned towards its trivalent state. Distinct changes of thermoelectric properties at low temperatures were reported by many groups. With ten percent of boron accommodated at interstitial sites of the $AuCu_3$-structure, the thermopower decreases by a factor of 3 and the broad maximum of resistivity shifts from 125 K to a much narrower one at 16 K. Substitution of Pd/Rh results in a smaller unit cell and shifts the Ce to its tetravalent state. Small amounts of Rh can even increase the thermoelectric figure of merit but with more than 20 % of Rh substitution the system shows almost simple metallic behaviour and has no relevant thermoelectricity. Here, we present transport measurements from 4 to 900 K on samples with various B and Rh concentrations. The measured thermal conductivity was separated by standard procedures into electronic and the lattice contributions, and both parts are further analysed in terms of the common Debye model.
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Keywords : $CePd_3$, transport properties, figure of merit