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Investigation of the novel tetragonal compounds BaT_2P_2 ($T = \text{Co, Ru, Pd}$)

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Tetragonal ACo_2Pn_2 (A : alkali or alkaline earth metals, Pn : pnictides) compounds are known for their exotic structure-property relationships [1-4]. Some of these compounds have also been reported to exhibit unusual behaviors, like the recently observed positive curvature in electrical resistivity of highly pure single crystals of KCo_2As_2 [5]. In the present work, we investigate the structural, magnetic, transport and thermal properties of polycrystalline samples of unexplored materials BaT_2P_2 ($T = \text{Co, Ru, Pd}$). Our study confirms that BaCo_2P_2 and BaRu_2P_2 crystallize with ThCr_2Si_2 -type tetragonal structures while BaPd_2P_2 crystallizes with a CeMn_2Si_2 -type tetragonal structure. All three compounds show metallic behavior and sizable density of states of conduction carriers at the Fermi level and do not exhibit any phase transition down to the lowest temperature of our measurements. We attempt to model the physical properties data of these compounds as well as explore the effect of lowering the crystal symmetry, if any. The experimental results will be discussed in detail and compared with the existing literature.

References

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Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

MSc

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