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Are Ge-based skutterudites promising thermoelectrics? Ground state properties, electronic and thermal transport¹

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Cage-forming compounds such as zeolites, fullerenes, clathrates or skutterudites have proven to be not only of scientific but also of significant technological interest. The ability of these materials to accommodate guest filler species provides a wide range of varying physical and chemical properties. The majority of cage forming elements of skutterudites is essentially based on volatile and/or toxic pnictogens (P, As, Sb). We report on the previously discovered skutterudites MPt_4Ge_{12} ($M = Ba, Sr, La, Pr, Eu, Th, U$) [1, 2, 3, 4] as the first members of a new class of skutterudites, based on a framework, entirely formed by Ge-atoms. A variety of bulk properties as well as band structure calculations allows understanding of superconductivity, magnetic behaviour. Electronic and thermal transport of these systems are discussed in terms of the temperature dependent electrical resistivity, thermal conductivity and Seebeck effect.

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