

Pressure enhanced superconductivity in cage-type quasi-skutterudite compounds

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Recently, we have been involved in systematic HP studies of both $R_5Rh_6Sn_{18}$ ($R = Sc, Y$) and $R_3Rh_5Sn_{13}$ ($R = Sr, Ca, La$) quasi-skutterudite systems [1,2]. In most of the investigated systems, there is a continuous increase in T_c with pressure. For example, the $Sc_5Rh_6Sn_{18}$ system show a continuous increase in T_c from 4.99 K at ambient pressure to 5.24 K at 2.5 GPa [1] and $Sr_3Rh_5Sn_{13}$ show a continuous increase in T_c from 4.85 K at ambient pressure to 6.43 K at 3.2 GPa [2]. Rattling atom (R) in the quasi-skutterudite lattice is found to lead to Raman-modes whose pressure-dependence can contribute to the understanding of electron-phonon coupling in these systems. Our HP Raman investigation combined with x-ray diffraction studies indicated a smooth evolution of lattice under pressure in the 0-10 GPa range in most of the above systems. Combining several members from each of the two families permit us to combine both physical and chemical pressure effects to provide a more universal PT phase diagram.

[1] G. Lingannan, B. Joseph, M. Sundaramoorthy, C. N. Kuo, C. S. Lee, S. Arumugam, *J. Phys.: Condens. Matter* **34** 245601 (2022) <https://doi.org/10.1088/1361-648X/ac61b6>;

[2] M. Sundaramoorthy, B. Joseph, G. Lingannan, P. Mondal, C. N. Kuo, C. S. Lee, S. Arumugam, *PSS-RRL* (2023) <https://doi.org/10.1002/pssr.202300078>