Boson peak in the specific heat of metallic glasses

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P47: Boson peak in the specific heat of metallic glasses

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We have studied low temperature specific heat (LTSH) in different glass-forming metallic alloys: binary marginal glasses ZrNi [1], bulk metallic glasses CuHfTi [2] and high entropy metallic glasses TiZrNbCuNi(Co) [3]. The results concerning so-called boson peak (BP) contribution to the density of vibrational states in excess to the Debye contribution are quite varied between these alloys.

While $Zr_{77}Ni_{23}$ does not show BP, in $Cu_{55}Hf_{45-x}Ti_x$ its position and amplitude vary monotonously with the Ti content, Fig. 1. In TiZrNbCuNi(Co) alloys with multiple principle elements, the position of BP scales roughly with the Debye temperature, while its amplitude shows more complex behaviour. We discuss these results in respect of the intrinsic differences between these alloys [4] and in the view of different theories of BP, see e.g. [5,6].

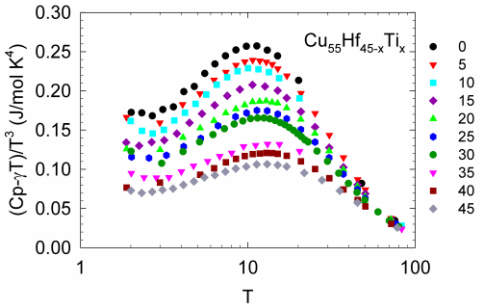

Figure 1 Vibrational contribution to LTSH of $Cu_{55}Hf_{45-x}Ti_x$ with γT linear electronic contribution subtracted.

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