Inelastic scattering on antimony bearing thermoelectric materials: rattlers revisited

R. P. HERMANN\(^1\), W. SCHWEIKA, Institut fuer Festkuerperforschung - Forschungszentrum Juelich, Germany, H.-C. WILLE\(^2\), ESRF, Grenoble, France — Antimony element specific measurements on EuFe\(_4\)Sb\(_{12}\) and Zn\(_4\)Sb\(_3\) will be presented in parallel with inelastic neutron scattering measurements on Zn\(_4\)Sb\(_3\). These results yield new insight in the rattler concept. First, the antimony specific DOS in EuFe\(_4\)Sb\(_{12}\) and CoSb\(_3\) provides experimental insight into the guest-host interaction mechanism which is required for a lowering of the thermal conductivity[1]. Second, the scattering vector dependence of the Zn\(_4\)Sb\(_3\) inelastic response reveals that "rattling" behavior is not restricted to single atoms and that more complex structural units, such as dumbbells, can exhibit a similar behavior that is responsible for a low thermal conductivity.[2] [The European Synchrotron Radiation Facility is acknowledged for provision of the synchrotron radiation facility at beamlines ID18 and ID22N and the European Community - ARI HPRI-2001-00175 is acknowledged for provision of neutron scattering beam time at the FRJ-II research reactor in Juelich, Germany.] [1] Schweika W. et al. Phys. Rev. Lett. 99, 125501 (2007). [2] Wille H.-C. et al. Phys. Rev. B 76, 140301(R) (2007).

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