

Title	Dynamics of coherent acoustic phonons in thin films of CoSb ₃ and partially filled Yb _x Co ₄ Sb ₁₂ skutterudites
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Abstract	<p>Skutterudites are considered as interesting material for thermoelectric applications. Filling foreign atoms into the cage-like structure of a CoSb₃ skutterudite is beneficial to its thermoelectric properties by increasing phonon scattering while maintaining the electrical conductivity. In this paper we demonstrate the generation and detection of coherent acoustic phonons in thin films of CoSb₃ and partially filled Yb_xCo₄Sb₁₂ skutterudites using femtosecond pump-probe spectroscopy. By using a pulse-echo method, the longitudinal sound velocity of amorphous and polycrystalline CoSb₃ thin films is obtained. For partially filled Yb_xCo₄Sb₁₂ thin films, an obvious decrease of the longitudinal sound velocity is observed at high filling fraction. Concomitantly, the high frequency acoustic phonon modes are strongly damped as the Yb filling fraction increases, which gives direct evidence for acoustic phonon scattering processes. It is shown that the reduction of lattice thermal conductivity after Yb filling is mainly achieved by the strong scattering of acoustic phonons.</p>
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