

Ultrafast dynamics in $\text{Cu}_x\text{Bi}_2\text{Se}_3$ and Bi_2Se_2 single crystals

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Ultrafast time-resolved differential reflectivity of $\text{Cu}_x\text{Bi}_2\text{Se}_3$ and Bi_2Se_2 single crystals is studied using femtosecond pump-probe spectroscopy. Two oscillations in measured transient-reflectivity-change curves are observed with two distinct frequencies, and are attributed to coherent optical and acoustic phonons, respectively. The coherent optical phonon is consistent with the A_{1g}^1 mode in Bi_2Se_3 obtained by Raman spectroscopy. We also observe that both the coherent optical and acoustic phonons are affected by the doped atoms. The possible mechanism for the modulation of coherent optical and acoustic phonons is discussed.

This project is financially sponsored by the National Science Council (grant no. NSC 98-2112-M-009-006-MY3 and NSC 98-2112-M-009-008-MY3) and the Ministry of Education (2009 MOE ATU program at NCTU) of Taiwan, R.O.C.