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Title:Far-infrared response of acoustically modulated transverse optical-phonon polaritons
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Abstract:The authors propose a scheme to achieve strong modification of the light properties in the terahertz (THz) range and in particular up to 70% changes in the THz reflectivity of CuCl, TlCl and LiNbO3 crystals. This is realised by using transverse optical (TO) phonons as a mediator in the interaction between an acoustic wave (AW) and a THz light field, via the strong anharmonicities of the interatomic potential. Their numerical modeling of CuCl, TlCl and LiNbO3 crystals also predicts that these effects are tunable by applying various coherent AWs from sub-GHz to few GHz frequency. The length of the interaction between electromagnetic and acoustic fields is also greatly reduced compared to conventional acousto-optics. The modifications of the reflectivity spectrum are because of single and multiple intra-branch phonon transitions within the TO-phonon polariton dispersion branches. © 2011 The Institution of Engineering and Technology.