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Coherent optical and acoustic phonon generation correlated to the charge ordering phase transition in La1-xCaxMnO3 ANTOINETTE TAYLOR, DAEYOUNG LIM, VERNER THORSMOLLE, RICHARD AVERITT, QUANXI JIA, KENHYUK AHN, MATTHIAS GRAF, STUART TRUGMAN, Los Alamos National Laboratory — We have observed coherent optical and acoustic phonon generation, which are strongly coupled to the charge ordering (CO) transition in $La_{1-x}Ca_xMnO_3$(x= 0.5, 0.58) using femtosecond optical pump-probe spectroscopy. Coherent optical phonons, observed at low temperatures, suddenly disappear above the charge ordering temperature T_{CO}. We attribute the sudden onset of coherent optical phonons to their enhanced coupling to the photoexcited charge carriers in CO phase. The oscillation frequency for coherent acoustic phonon depends on the probe wavelength, which is consistent with the propagating strain pulse mechanism. The dramatic change of lattice constants across the charge ordering transition explains the overall temperature dependence of the coherent acoustic phonon amplitude.

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