Strong nonlinear terahertz responses of excitons in Cu_2O

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Excitons in Cu_2O have attracted significant attention due to their peculiar properties, such as the remarkable Rydberg series with the principal quantum number extending up to 30 [1, 2] and the realization of Bose-Einstein condensation [3]. We report on a time-resolved optical-pump terahertz-drive spectroscopic study of far-from-equilibrium states in Cu_2O. Strong terahertz third harmonic generation is observed and investigated as a function of the pump- and drive-pulse fluences and by varying the pump-drive time delay. Owing to the sub-picosecond time resolution, we are able to identify two distinct third-order nonlinear terahertz responses in the time domain. By carrying out a systematic investigation of these responses, we can attribute the observed nonlinear responses to plasma and exciton dynamics, respectively.

References

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