Abstract Submitted
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Electronic structure near the Fermi level in the ferromagnetic semiconductor GaMnAs studied by ultrafast time-resolved light-induced reflectivity measurements[1] TOMOAKI ISHII, TADASHI KAWAZOE, Univ of Tokyo, YUSUKE HASHIMOTO, Radboud Univ Nijmegen, HIROSHI TERADA, IRIYA MUNETA, MOTOICHI OHTSU, MASAAKI TANAKA, SHINOBU OHYA, Univ of Tokyo — The determination of the Fermi level (E_F) position is important to understand the origin of the ferromagnetism in ferromagnetic semiconductor GaMnAs. The recent transient reflectivity (TR) spectroscopy measurement, which is potentially sensitive to the absorption edges, indicated that the E_F exists in the valence band [1]. However, the pump fluence in this study is rather high, and the accumulation of photo-carriers can shift the absorption edges. Thus, the definition of both the band gap and E_F is obscure. Here, we have performed TR spectroscopy measurements on GaMnAs films with the pump fluence carefully controlled to suppress the accumulation of photo-carriers. The energy resolution of the TR spectrum was improved to 0.5 meV. The data shows light-induced change in the reflectivity spectra which is attributed to the band-gap renormalization and band filling. We have reproduced the observed TR spectra using the Kramers-Kronig relation and found the Mn-induced electronic states near the E_F in the band gap. [1] T. de Boer et al., Phys. Rev. B 85, 033202 (2012).

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