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All optical FMR of ferromagnetic (Ga,Mn)As with various Mn contents SATOI KOBAYASHI, YUSUKE HASHIMOTO, HIRO MUNEKATA, Imaging Sci. and Engin. Lab., Tokyo Tech. — We have investigated all-optical FMR of non-thermal origin [1] on (Ga,Mn)As with various Mn contents x with time-resolve MO signals obtained by a single-wavelength pump and probe (P&P) technique, and found clear dependence of x on the effective magnetic field on ferromagnetically coupled Mn spins. (Ga,Mn)As samples x = 0.02-0.11 were grown by molecular beam epitaxy. Measurements were performed for both as-grown and annealed samples. In-plane magnetization easy axis was [1-10] for the x = 0.11 sample, whereas it was <100> for the rest. Samples were magnetized prior to P&P measurements. Polarization of probe pulses was carefully controlled with respect to the direction of M. Pump power was varied between 3.4 - 34 μJ/cm^2. Precession of magnetization was clearly observed at 10-40 K in most of samples. The period of the oscillation becomes longer with increasing x value, indicating a decrease in an effective magnetic field $H_{eff} = \hbar\omega$ / $g\mu_B$ on Mn spins from 0.2 to 0.1 Tesla with increasing x. Assuming $H_{eff} = J_{pd} < s >$ with constant J_{pd}, the observed trend suggests the reduction in the mean spin density of holes $< s >$ with increasing x. [1] Y. Hashimoto and H. Munekata, arXiv: 0707.4055v2; H. Takechi *et al.*, phys. stat. sol. (c) **3**, 4267 (2006).

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