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Control and probe of carrier and spin relaxations in InSb based quantum wells[1] KANOKWAN NONTAPOT, R.N. KINI, G.A. KHODAPARAST, Virginia Tech, N. GOEL, T.D. MISHIMA, M.B. SANTOS, University of Oklahoma — The growing interest in spin-related phenomena and devices has prompted intense activity in the science and engineering of narrow gap semiconductors (NGS). NGS offer several scientifically unique features such as small effective masses, large g-factors, high intrinsic mobilities, and large spin- orbit coupling effects. In this work we report the dynamics of photo-excited carrier/spin in several InSb based quantum wells (QWs) using standard pump-probe spectroscopy and magneto- optical Kerr (MOKE) effect. Our InSb QWs are grown on GaAs (001) substrates with the $Al_xIn_{1-x}Sb$ barrier layers. We studied one undoped and five doped QWs with the electron concentrations in the wells ranging from $\sim 1 - 4.4\times10^{11} cm^{-2}$, where only the ground-state subband is occupied. The electron mobility in the samples are ranging from $\sim 70,000 - 100,000 cm^2/Vs$ at 4.2 K. We observed strong dependence of the dynamics to the density of photo-excited carriers and the pump photon energy and only weak variation with changing the samples' temperature. Our results are important to understand different relaxation mechanisms in NGS with strong-spin orbit interactions.

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